THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. CVIII. No. 2433.] LONDON, DECEMBER 28, 1909. [61ST YEAR. PRICE 6d.

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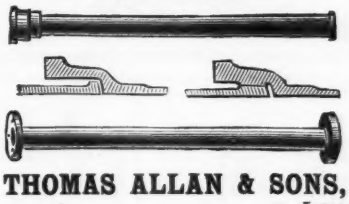

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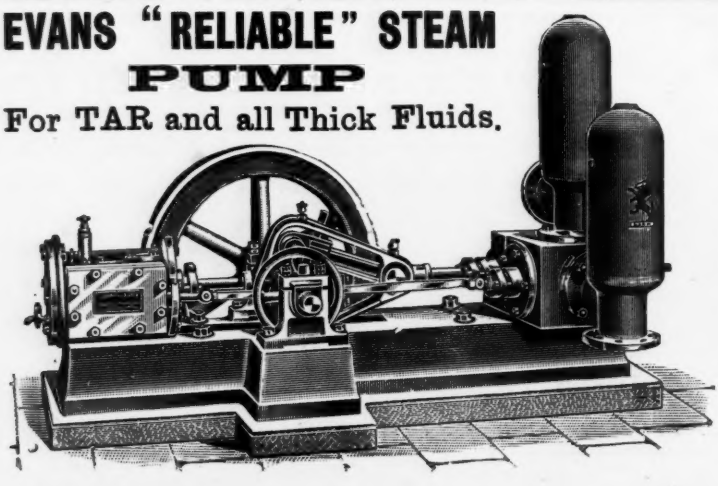

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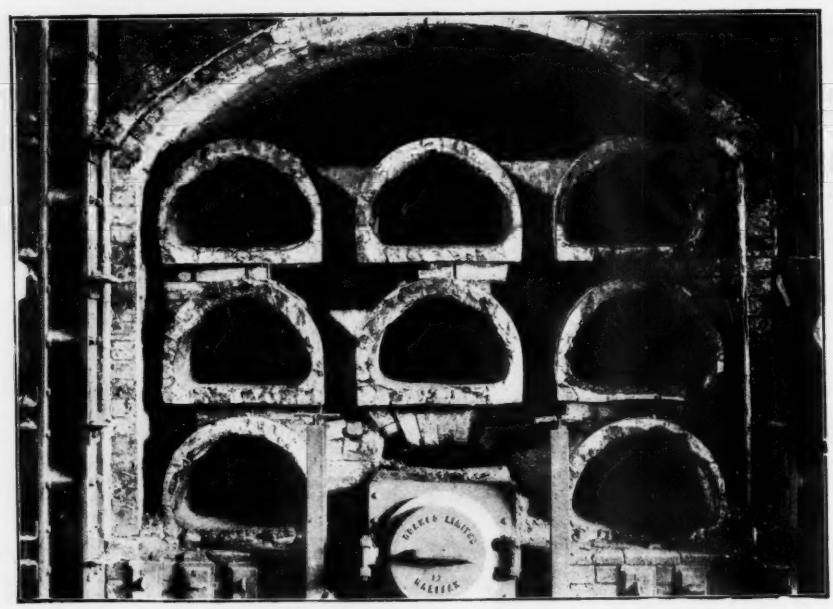

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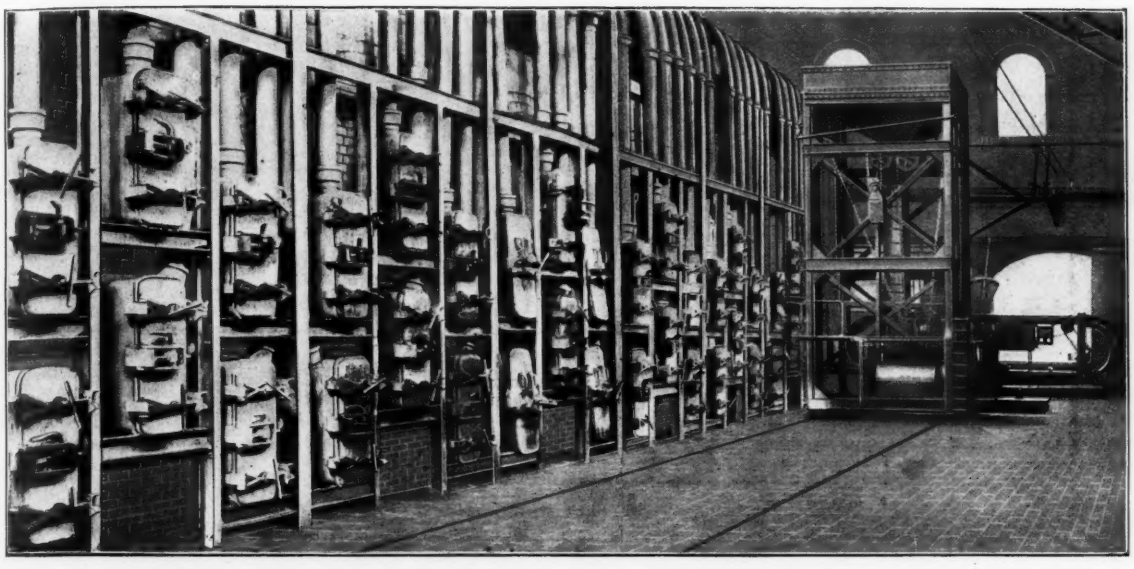

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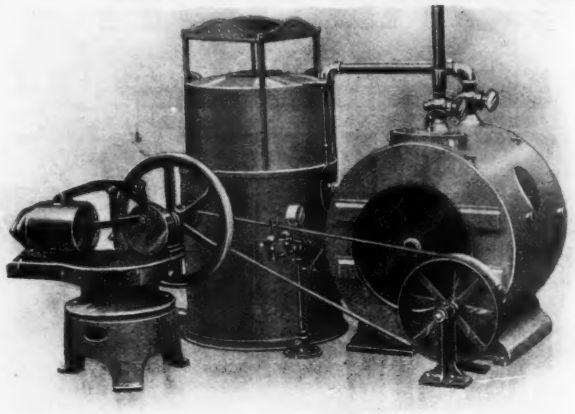

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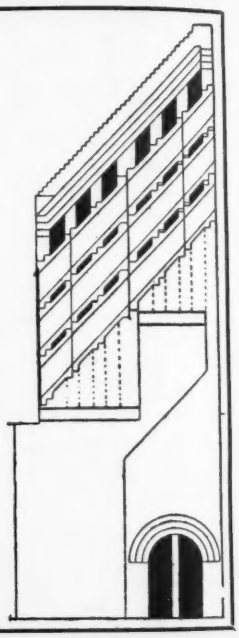

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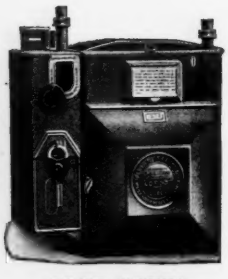

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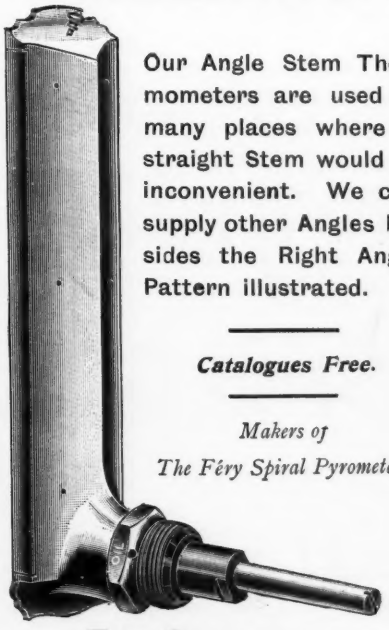

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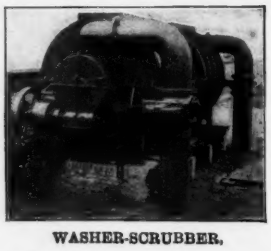

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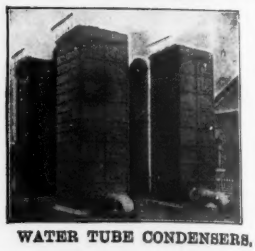

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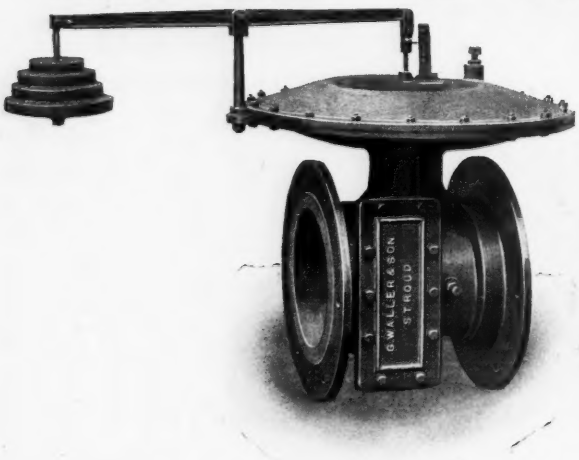

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CONTENTS.

EDITORIAL NOTES.

GAS, &c.—

1909—A Retrospect 861

Advantages of Co-Partnership — "Good-Bye" — Wiping-Out Competition in Buenos Ayres—Coalite Working Costs Not Known — Coalite Gas and Gas Undertakings—An Extraordinary Idea—Quality of Coal Important—New Mining Arrangements in the North—Municipal Superannuation Suggestion — Illegal Levies 869

WATER AFFAIRS—

Review of the Principal Events of the Year 877

Gas Stock and Share Market 872
Electricity Supply Memoranda. 872
Lunge's "Coal Tar and Ammonia" . . . 874
Improvements at the Ilkley Gas-Works . . 875
Statistics of Dutch Gas-Works 876
Parliamentary Municipal Trading Return . 883
Some Aspects of Technical Education. By Norton H. Humphrys, Assoc.M.Inst.C.E., F.C.S.. 884
Air-Gas Lighting: Its Advantages, Some of Its Defects, and How to Remedy Them. By H. A. Carter. 886
A Radiometric Photometer 888
Joints of Gas and Water Mains. 888
The Grading of Gas-Mains—The "Gradiograph" 890

REGISTER OF PATENTS.

Producing Hydrogen—Clark, G. M. (Dellwik-Fleischer Wassergas, G.m.b.H.) . . . 891
Gas Cooking-Stoves—Aird, K. 891
Gas-Washers—Davis, G. K.. 891
Gas-Producers—Williams, H. W. 891
Controlling Gas-Burners from a Distance—Renkewitz, E. 892
Charging Gas-Retorts, Coking-Ovens, &c.—Masters, E., and Hansford, J. 892
Quenching Incandescent Coke — Krause, E. H. H.. 893
Gas-Lamps—Walker, A. B., and Donaldson, J. H. 894
Applications for Letters Patent. 894

CORRESPONDENCE.

Coulson's Tar Patent. 894
The Catastrophe at the Hamburg Gas-Works 894

MISCELLANEOUS NEWS.

Profits from Gas Supply in Paris 895
South Metropolitan Co-Partnership Scheme —The Year's Work 895
New York Public Lighting 896
Meeting of the West Ham Gas Company. . 896
Buenos Ayres and Its Gas Supply 898
Meeting of the British Coalite Company . . 901
Presentation to Mr. T. Palin, of Donnington 903
Municipal Superannuation 904
Current Sales of Gas Products 905
Coal Trade Reports 906
Pocket-Books, Calendars, &c. 906
Gas Stock and Share List 907

LEGAL INTELLIGENCE.

The Claim by a Former Greenock Gas Manager 894
Underground Water Supplies in America . 894
Water Company and Non-Domestic Supplies 895
Reinstatement of Roadways. 895

PARAGRAPHS.

Personal 872
Electrical Misrepresentation 872
Obituary. 873
Inspecting Gas Examiner for the London County Council—Cost of Working a Gas-Power Plant—The Spelling of the Name of the Inventor of Gas Lighting. 884
Gas and Oil Engines in Australia—Reports of Gas Associations for 1909. 888
Poisoning by Carbon Monoxide—Recent Wills —The Gas-Engine of the Future . . . 890
Bingley and the Wilsden Gas Supply Rights 897
Serious Charge against a Gas-Works Clerk—Incandescent Gas Lighting in Bloomsbury 903
Illuminating Power of London Gas—The British High-Power Gas-Engine Company, Limited—New South Wales Coal Strike and the Sydney Gas Supply—Inadequate Electric Street Lighting at Hastings 906
Alleged Falsification of Time Sheets—Quality of Coventry Gas—The Quality of Truro Water Supply—Thefts from Morecambe Gas-Works—Increased Storage at Buckhaven—Water Supply of Instow—Shop Fire through Gas at Herne Bay—Value of the Land for the Carlisle Water Scheme . 907

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1909.

A Retrospect.

MEMORABLE in the history of the nation will be the year now drawing to a close, on account of the internal friction in regard to the fiscal proposals of the Government. From the time of the introduction of the Budget by the Chancellor of the Exchequer to the day of its reference to the country by the House of Lords, the political world was in a perpetual ferment. The facts that the question of rejectment or acceptance of the principles underlying the Budget has been referred to the great electorate, and that the only process by which this could be done was by dissolution of Parliament and a General Election, do not appear to have had the slightest detrimental influence upon the conditions of the country, but rather the reverse. All throughout the parliamentary session, capital and property have been sensitive to the prevailing influences. To many people, it appeared that the predominant party in the Legislature were fast slipping under the rule of those in the Cabinet whose leaning is palpably greater towards Socialism than the old Liberalism. Socialism has captured the Trades Unions; and the progress in influence that Socialism and Communism have been making in the deliberations of the national government has been a striking feature in the history of latter times. If there is success in the aims of the movement of which so much has been seen, the effect can only be the creation of an artificial condition of things, to the everlasting disadvantage of the country. There are people who fail to see, or affect not to see, the drift of these movements, and who deliberately narrow their comprehension by party prejudice. This is to be deplored. Without evincing any political bias here, it may be said that the established tendencies and ambitions of the two great parties of the State could be well maintained on separate lines, with benefit to the country, without playing into the hands of political and social extremists.

Trade has not been brisk during the year; but towards the end, there were signs of an improvement. November showed an excellent increase in both imports and exports, though exports for the year to the last returns show a decline. On the eleven months ending with November, there had been an increase on imports on 1908 of £27,629,999, but a decrease of £3,228,456 on exports; while re-exports showed an increase of £10,251,501. Looking over the constituent figures, it is remarked that in the eleven months exports of 60,151,000 tons of fuel only realized £33,972,000; while in the same period of 1908, 59,808,745 tons realized £38,380,105. Political and trade conditions had influence in the Money Market; and the year witnessed some notable fluctuations of the Bank rate. In January it was at 3 per cent.; in April, 2½ per cent.; and with intervening periods of seven days in October, it rose from 3 to 4 and then to 5 per cent. In the Stock and Share Market, there was the usual record of oscillation. The first few days of the year, a cheerful mood pervaded affairs; but this was not sustained. The troubles in the Near East, agitation in the American market, fears in the Railway market of a coal strike, the Morocco affair, the clouds in the home political arena, and the general uncertainty that appeared to brood over home affairs, were among the disturbing factors of the year. The South African market had a period of sunshine; but generally the condition of affairs in the markets was typical of the weather—a few days' brightness was certain of being succeeded by a spell of gloom. Business in the Gas market was in its movements largely in sympathy with all other markets—sometimes it was good, sometimes bad; sometimes it was well distributed, and sometimes very restricted. Gaslight stocks maintained their improved estimation as an investment; and there was further ascent in price early in the year on the announcement of the reduction of the price of gas, and the increased dividend that would follow. In other directions, comparing prices at the beginning and the close of the year, there is not any specially significant feature—there are movements up and down, but of no remarkable amount, and in some cases prices have remained absolutely stationary. Brentford, Brighton original, Ilford, and Wandsworth and Putney may be named as having put on financial flesh; but most of the suburban concerns were, as things go nowadays, in very good odour. West Ham increased in price on the amalgamation scheme (confirmed by Parliament) with the Gaslight and Coke Company. Sheffield, one of the heavy stocks, has shifted back a bit; but there is nothing else among quoted Provincial Companies of striking importance. Farther afield, the same may be said of the Continental Companies—even Continental Union did not suffer to the extent that might have been imagined would be the case from the reverses of the year. The Buenos Ayres, River Plate, and Primitiva Companies were strong on the amalgamation of forces; in fact, the South American gas market was generally in favoured condition. There were a fair number of issues of gas stock during the year. Prominent among the sellers by auction have been Messrs. A. & W. Richards—not only of new issues, but of stocks and shares for executors, trustees, and other private owners. For all these, the firm have found a never-failing demand. They report that they cannot say there has been very much variation in prices as compared with 1908, though, on the whole, they would regard the demand as having been stronger, and at slightly better figures.

A SURVEY OF THE CONDITIONS AFFECTING THE GAS-TRADING CONDITIONS OF THE INDUSTRY.

Coming more particularly to the business of the industry, and the conditions affecting it. The position in relation to the latter is both interesting and, in a measure, critical. There is no inherent weakness; the strength of the industry is fully maintained; and there are the evidences around that the depths of its potentialities have not yet been sounded. What is critical rests in the manner in which the new conditions that have arisen, and that are still arising, are met. The gas industry is being subject to more and more vigorous attack; it has not only to resist attack, but to attack the intruders, who have a perfect right to intrude, if they can do so by fair means. Commercialism is growing more and more agressive. To blink the fact would be suicidal. The internal affairs of the gas industry—manufacturing operations, products (both primary and secondary), and methods of business, those that cultivate and those that protect—have all to be shaped to the new circumstances. The subjects of coal and the secondary products will be referred to later. But as to the gas business proper—the sale of gas—it has to be recognized that the electricity industry is, in its lighting department, stronger for obtaining new business than it was before the advent of the metallic filament lamp; and that it can offer light now on better terms than before. But, simultaneously, the gas industry has not lagged behind. There has been a growth in lamp efficiency; and more illumination can now be offered per cubic foot of gas consumed than ever before, while the units of light now range from a few candles per point to thousands. All requirements and all tastes can be catered for. The industry has witnessed progress in the means provided in this direction during the year. But in competition we have to meet the living fact that, when a competitor can offer his goods at a lower rate than before, there is an attraction for some people to change their custom; and the consumer can use the fact to the furtherance of his own interests. The cultivation and protection of the lighting business therefore demands that still greater attention should be paid to the consumer. There has been enhanced recognition of this during the year; and this, and the new enterprise of gas undertakings, have not been very pleasant for our electrical friends. Many gas undertakings have adopted free maintenance—cleaning and adjusting consumers' burners free of cost, and charging only for the

materials used in maintenance. The subject was discussed at the Southern District Association meeting in November; and some interesting experiences were put on record.

Shop, factory, and street lighting, high-pressure gas distribution questions and developments have been prominent. There is a demand for high-power sources of illumination; and the industry has to comply, or lose the business. District high-pressure supply, in favourable localities, is a means to keeping the end of gas supply up in the competition with the flame arc lamp. Demonstration of this is made in the high-pressure gas supply in Fleet Street and the neighbourhood. The street is lighted by Keith high-pressure inverted lamps. From the principal line of mains, the Gaslight and Coke Company have had to make several branch extensions so as to meet the requirements of factories and other business premises and further installations of public lamps. Instances of the application of high-pressure gas lighting have been published—for shop lighting as well as illumination of public buildings; Alexandra Palace being a case in point. Efficiency for street lighting in comparison with competitors has been attested by Professor Drehschmidt, and others. A report of exceptional merit was made by a deputation of the City of London Corporation, who visited the Continent to investigate the lighting in vogue in some of the principal cities. The result was distasteful to electricians. The inverted gas-burner—high-pressure for main streets and low-pressure for side streets—appealed to the investigators as the means of lighting *par excellence*, with the condition attached that, wherever possible, there should be central suspension. Though this introduces complication in street lighting, there is no difficulty. Inverted lamps for street illumination, particularly in South London, have taken the fancy, owing to efficiency, of many local authorities who are not influenced by the possession of municipal electricity supplies.

Herein has been a matter of much irritation during the year. In many towns, the local authorities with electricity stations have thrown questions of economy and efficiency to the winds, spending money on the conversion of street lamps to electricity with no stronger reason than that the electricity stations belong to the towns concerned. In other words, the community, according to these authorities, is to be mulct in additional expense without obtaining improved service, for the sole purpose of putting more business in the way of the electricity undertaking. This is how the principles of economic administration are being widely violated. This peculiarly improvident attitude of some local governing bodies has brought them into dire conflict with the Local Government Board, who have refused loans until the local authorities can show (which they fail to do) advantage to the ratepayers from the change. Tested by Hastings, ratepayers are not pleased with the result of the conversion from ordinary incandescent gas-lamps to metallic filaments. A big scheme of conversion, despite the reproval of the London County Council, is that of the Marylebone Borough Council. Many other authorities are also persisting in carrying out their conversion schemes by making provision annually for initial payment from the rates. The ratepayers want educating as to the doings of their masters, who in most cases decline to enter into the questions of comparative costs (as at Finchley), and in some cases are even afraid of comparative demonstration (as at Plymouth). Beckenham left the matter to public judgment; and the Carpenter inverted gas-burner scored over electric metallic filaments. Gas likewise won in open competition at Bradford. The Gas Companies' Protection Association are asking for information as to what is being done by local authorities in this matter of unfair and preferential treatment, so that a good stock of evidence may, on suitable occasion, be laid before the proper authorities. Something clearly has to be done, and the quicker the better. The criticism does not apply to those local authorities who are not burdened by electricity undertakings. The ratepayers in such places are well off.

Not only, however, in public lighting, but in the lighting of public buildings are local bodies pursuing the policy to which attention has been directed. From a report to which we gave circulation this year, it was seen that a Committee of the Local Government Board have expressed it as their well-considered opinion that there is no justification for the conversion of the illumination of public institutions from gas lighting to electric lighting, in view of the modern developments in the former, and their economy. Remarkable is the considerable extension that is being made in the application of automatic means of lighting to street gas-lamps; and, almost without exception, reports are favourable to both efficiency and economy, so much so, indeed, that in "The Times," "Daily Telegraph," and other daily papers, popular references have been made to the "passing of the "lamplighter." While treating of lighting matters, we may just append the remarks that the price of monazite sand has further fallen; and that prospecting has revealed the fact that the deposits in Brazil are widespread, and not limited so much as was at one time thought to be the case. There is promise of a metallic filament mantle being placed on the market at an early date, the invention of Herr Reeser; but questions connected with manufacture and exploitation have delayed an immediate entry into the trading stage. Among the things to be thankful for is the fact that the fertility of the Chancellor of the Exchequer in inventing fresh sources of revenue has not extended to the taxing, as in Germany, of gas mantles and electric lamps.

From all quarters during the year, reports have been consistent as to great increases in the addition of consumers—more particularly prepayment—and for heating and cooking. The heating business has been booming this season; and we have it placed on record that, in London, the demand for gas-fires has never been so heavy as has been experienced in the opening of this winter season. Manufacturers have not known such a busy winter season for the past seven or eight years. The seven lean years have passed; we hope the seven fat ones are in store. The improvement of efficiency of gas-fires is becoming better known. They are in these times advertising themselves. Prejudices are dying a natural death. The medical profession are being forced to acknowledge that their views, if at one time they had partial foundation, have now had their supports knocked away by progress. But there has been evidence that the architectural profession stands sadly in need of a little educational work to eradicate false motives. The makers of the fires have applied themselves assiduously to improvement on scientific lines; and while themselves adopting research in laboratory and testing-room, they are broad-minded, and accept gratefully the suggestive results of investigation from whatever quarter they come—be it the Fuel and Gas Engineering Department of the Leeds University, or the privately conducted research of the gas expert. The work of the smoke abatement enthusiasts is also having effect. They are the friends of the gas industry. Gaseous fuel and electricity for heating purposes, they recognize, serve their cause, and occasion no labour to the user; while of the two, gaseous fuel is the cheaper and the more efficient, inasmuch as 6 cubic feet of gas are approximately equal in thermal value to a unit of electricity. In gas cooking-stoves, there is not much room for improvement; but their popularity remains undiminished, and the cooking appliances of the electrical industry still occupy, and bid fair to continue to do so, the sphere of novelty. As novelties, and not as articles of practical utility, they are accepted. In water-heating by gas, there is encouragement in expanding adoption through the recognition of the convenience.

In industrial centres, the applications of gas to manufacture are developing apace; and one of several illustrations that came before us in the course of the year is found in the statement made, as to extended use, at the last meeting of the Sheffield United Gas Company. In the power business, the competition from producer gas, suction gas, and electricity has been unceasing. But the gas-engine has not stood still. There has been much recent publication on it; and it has been shown that considerable strides have, during recent years, been made in mechanical efficiency. A resolute attack is being made by a Committee of the British Association on the problems that have to be solved to attain to yet greater efficiency, and which problems have not yet been systematically dealt with by individual inquirers. A positive line of investigation has been mapped out by the Committee; and reports on their future work will be anticipated with much interest. A notable development (which has yet to be proved on a large daily working scale) is the Humphrey gas-pump, which has lately excited considerable attention in engineering circles. In connection with power supply, we were invited by Mr. W. A. Tookey, in a special contribution to our pages, to accept the principle of a limitation to the field of town-gas application, on the ground that other forms of power—such as suction gas—have all of them their special fields, which town gas cannot touch commercially. But with all deference, the suggestion was rejected. Town gas can accept no such limitation. Ambition and work are directed to putting gas into the distribution mains that can be sold commercially for all objects. To whatever

purpose gas can be usefully applied, there it has a legitimate sphere, and one within which business may be sought.

Suction-gas plant has not been heard of so much during the year. It has been referred to on sundry occasions in our columns, but mostly in the way of criticism. Its novelty is wearing off; its weaknesses, difficulties, and drawbacks have become better known among manufacturers. And they are preferring constancy in more ways than one, so long as town gas suppliers are willing to supply on reasonable terms. They have also gained experience in the question of costs, and find that the fuel cost per brake horse power is but an indefinite basis on which to depend, and that it is not by any means a comprehensive figure. They find, too, that the inspectors of factories are paying more rigorous attention to the location of such plants, and insist (for the protection of workpeople) on adequate ventilation where the plants are situated. Complaint has also been made by Dr. Collingridge, the Medical Officer of Health of the City of London, of the abominable nuisance occasioned by the washings from gas-producers; trouble having been caused in several cases by the odour of the effluent which contained sulphuretted hydrogen. True, the odour can be practically eliminated by the use of permanganate of potash. Nevertheless, manufacturers do not take kindly to these additional troubles that are absent from a town gas supply to an engine. Before the Scottish Junior Association early in the year, Mr. Henry O'Connor delivered an instructive lecture in which he dealt with this form of power competition. A large scale installation of gas-engines, aggregating 1000-horse power, installed at the Shad Thames pumping-station of the London County Council, and supplied with gas by the South Metropolitan Gas Company, was described in our columns during the year. Some attention, too, has been given to the installation of private gas-driven plants for generating electricity.

We have dealt at some length with these questions of current moment, all bearing upon the commercial side of the gas business. Though "at some length," the review is only a cursory one; the number of influences, advantages and disadvantages, bearing upon the gas business to-day are so numerous. But they emphasize the importance of the work of a gas undertaking lying outside the pale of gas manufacture and gas office; and there cannot be too much insistence upon the commercial work relating to gas supply being placed in the hands of a responsible and adequately remunerated officer, in all but undertakings of very limited dimensions. The times have changed; and changes of the kind demand an alteration of practice. Such responsible heads of the commercial gas department have been appointed in many places. The suitable man for the work is one possessing several qualifications: Tact and judgment, alertness, and one with a scientific and practical knowledge of his business, and with an aptitude for keeping knowledge abreast of all development in gas, and not only in gas, but in the camps of the competitors. The latter is important. The responsible head of the commercial gas department must never allow himself to rest under the stigma of having been driven into a corner through want of knowledge. These are matters that have impressed themselves most forcibly on observant minds during the year the events of which are being scanned. In prosecuting the commercial work of the gas industry, there have been a few local exhibitions during the year; and the Gaslight and Coke Company fitted up a bungalow at the Shepherd's Bush Exhibition. An innovation is the Gas House of the South Metropolitan Gas Company in a developing part of their area. Show-rooms, too, are on a more elaborate and attractive scale than formerly. But the largest amount of work, and the best all round, has been by getting into personal contact with consumers present and prospective, and by means of advertising in the general and local press. All such enterprise is not only welcome, but needful.

The Business of the Year.

As to gas-consumption results, experiences have been vastly divergent in the year as between one district and another. Price no doubt has a part in this; but examination of the records leaves little doubt that local conditions in regard to building development and depression of particular trades are the dominating factors in the situation. It is true that the inverted incandescent burner continues to exert a reducing influence upon consumption per customer; but, on the other hand, all round, new connections for lighting, heating, cooking, and industrial purposes, are being made without any interruption. The shifting propensity of some householders has resulted in many "empties" in certain districts in London; and these, combined with depressed trade, have caused the consumption returns of the more important London Companies to only about maintain a constant level. The figures might have been worse had not the weather been generally damp and cheerless, almost through the year. But for the past half year, we shall not be surprised to hear that there has been a better showing in the matter of increase than for some time past. In the suburban areas, generally speaking, the consumption position was good, though not in all cases; in the others, the percentage increases continued on the high ground to which they had reached in preceding years. Farther afield, though the rates of increase were not commonly of a large order, the companies showed, as a rule, satisfactory progress; but many municipal authorities in the big industrial areas presented rather bad records, particularly in the textile districts, thus continuing the tale of depressed business portrayed in the Board of Trade gas undertakings returns for 1908-9 issued and reviewed in our columns quite recently. There have been two sets of these returns issued during the year—the department having made a successful effort to ensure that the complaints of dilatory compilation and publication should cease. It is not asked that the record made by the last issue should be beaten; but it is hoped it will be maintained. We will not draw attention to the figures in the returns, as they have been so lately discussed. Returning for the moment to Metropolitan Gas Supply, it should be said that the Gaslight and Coke Company made during the year further marked strides in that financial rehabilitation that set in with the accession of Mr. Corbet Woodall to the Governorship and the infusion of new blood into the administrative work, and with the greater freedom accorded by the administration to the technical staff, under the headship of Mr. T. Goulden. Lower priced gas, higher dividends, and the workers brought under a co-partnership scheme, are of the fruits of achievement—all contributing parties to prosperity are sharing in them. In the South Metropolitan Company, the two great events of the year were the first appearance before the proprietors of Mr. Charles Carpenter as Chairman, and the remarkable increase in the production of gas per ton of coal carbonized, which alone made a striking difference in the Company's financial showing.

Looking farther afield, the reports from abroad (save from South Africa) indicated that the gas business was flourishing almost everywhere. Australia showed that a big step had been made in the return to more prosperous times in trade generally, in which changed condition the gas undertakings participated. A remarkable instance of the recuperative power of a gas undertaking was presented in an article by Mr. P. Holmes Hunt, in which it was seen how the business of the Metropolitan Gas Company of Melbourne fell off by no less than 45 per cent. between 1891 and 1897, through the then prevalent cloud of depression over Australia. But by 1908, there had been recovery by about two-thirds of this. Towards the end of this year, however, Australia had to suffer the trials and set-back of a coal strike; but fortunately, at the time of writing, a settlement is well within sight. Speaking of supply abroad, the notable amalgamation just effected of the interests of the Buenos Ayres (New) Gas Company, the River Plate, and the Primitiva Companies in Buenos Ayres should be mentioned. Among other features of the year in home gas supply have been the very general reductions in the price of gas throughout the country—and as having achieved in this respect a distinguished position in London gas supply, the Wandsworth and Putney Company may here be specially mentioned for their current ordinary price of 1s. 11d. per 1000 cubic feet—the continued annexation of territory by gas companies, particularly provincial ones; and the consolidation of gas supply by the amalgamation of small concerns to larger ones. In this there is advantage all round, especially to the consumers in rural areas. Another feature is the increasing application by gas companies to Parliament for electricity supply powers. Two or three failures of gas supply had to be noted during the year—at Long Sutton, at Wigton, and a partial one at Sunderland. These are extraordinary occurrences in the gas industry. At Wigton, the cessation was brought about through the bursting of a water-main, and at Sunderland through an error of a water turn-cock. A more convenient position will not be found than this for referring to the question as to gas companies having been much exercised over the instructions of the Board of

Inland Revenue to their surveyors not to make them any allowance for depreciation in respect of income-tax. The matter has been much debated at meetings, and in our "Correspondence" and other columns. One peculiar feature is that what is denied to gas undertakings in this regard is to be allowed to electricity concerns. There is to be resistance; but no movement has yet taken place in making common cause in the matter.

Generally speaking, the conditions of industry in the year have been favourable to the purchase of materials. Contracts for gas coal were entered upon betimes in the spring; and, market quotations notwithstanding, the prices at which the contracts were finally settled were, as a rule, below those ruling in the year preceding. On the whole, however, market prices have been fairly well maintained—more owing to internal troubles than to those factors that usually influence the markets—and at the close of the year the figures show a little hardening compared with the beginning. This may be due to two or three causes. There are symptoms of improved trade; and there is the knowledge that the Coal Mines (Eight Hours) Act has been the cause of a restriction of output in certain of the coal-fields—more particularly South Wales. The Act has proved a veritable storm fiend. It has twice during the year brought us to the very brink of a national war between coal-masters and men; and it has caused several small local trials of strength. The Miners' Federation have been restless in this matter during the year. Recourse has been had by the South Wales miners to legal procedure to get an interpretation as to whether the extra hour's work on sixty days per year is within the determination of the masters without reference to the men. The men contended that the Act in this regard is merely permissive, and that it is within their option as to whether they work the extra hour. The matter has been carried to a higher tribunal than the Court of the Rhondda Stipendiary, who pronounced in favour of the masters; and his judgment has been upheld. In Scotland, there was a difference between masters and men as to the principle of a higher irreducible minimum wage per man per day. There were other points in dispute, but that was the chief issue. The parties were inflexible. A poll of miners throughout the country was taken to bring pressure to bear on the Scotch owners; with the result that 518,361 miners acquiesced in a national strike, as compared with only 62,980 against. The Scotch masters, rather than precipitate the country into a war that would have brought untold injury, in greater or less degree, to the whole nation, made terms with their men. It was feared there might be trouble when the Act came into force, on Jan. 1 next, in Durham and Northumberland; but at the eleventh hour there has been a settlement of terms between the Durham owners and miners. The London and Suburban Gas Companies using the River Thames are now, in common with other coal users, threatened with a tax, under the new Port of London dues, of 6d. per ton of coal; but the proposed schedule of dues is subject to inquiry and the hearing of parties opposing. Technically, in connection with coal, a feature of the year has been the research work on the gas-making properties of fuel at the Carlsruhe experimental works of the German Association of Gas and Water Engineers, and at the Federal Coal-Testing Laboratory at Zurich. Dealing with coal reminds also of the agitation in which gas undertakings took part as to railway demurrage charges in Scotland; and of the big inquiry before the Railway Commissioners as to railway charges for the conveyance of goods to and from the Birmingham Gas-Works. The results of the inquiry were gains by the Department on several points by agreement and concession; but, on the main question, the Railway Companies were adjudged to be within their rights. The discussion and the issue showed that what is legal in these matters is subject to a great deal of individual adjustment in respect of consideration for special services rendered either by the railway companies or at the gas-works.

Bye-products did not, as seen by the accounts of gas undertakings issued during the year, show up at all well; and had it not been for the lower price of coal and oil, and the improvement that many concerns achieved in their gas-manufacturing results, so causing coal and labour to cost less per unit of output, the bye-products position would have made the financial position of most concerns one that would have been anything but gratifying. However, the prices of coke during the year have not fluctuated greatly; and the prices of sulphate of ammonia at the beginning and the end of the year have resemblance. Tar and pitch are higher in value now than they were in January. But the opening and closing prices for other products do not exhibit any remarkable variation. One matter in connection with bye-products has been forcibly brought before us during the year through the available channels of information—especially the returns obtained through the Census of Production Act, Messrs. Bradbury and Hirsch's sulphate of ammonia report, and the report of Mr. R. Forbes Carpenter, the Chief Inspector under the Alkali Works Regulation Act—and that is that the products from competing sources of supply are increasing largely, and that their prospective competing potentiality is considerable. This being so, as the late President of the Institution (Mr. Thomas Glover) and others have insisted, everything possible must be done to cultivate present sources of demand, and to encourage the opening up of new ones. The supply of coke in small quantities locally for domestic use has been tried, and found successful. A system of dry quenching of coke—"Charco"—was introduced during the year; the principal claimed merit of the system being the superior character of the resulting material for domestic fire-places. As to sulphate of ammonia, the Sulphate of Ammonia Committee continued their propaganda work; and they are striking out on new lines. They are with continental producers devoting attention to stimulating greater demand from distant parts of the world. But home producers should realize that it is folly to be niggardly where propaganda work is concerned. If it is worth doing at all, it is worth doing well. India, it is expected, will become a considerable consumer of sulphate of ammonia for sugar cane cultivation. It is largely employed for the purpose in the West Indies and Japan.

Tar cannot shift from itself the term of reproach among producers, "a drug in the market." From all quarters, there come reports of beneficial and satisfactory use for road-surfacing purposes. That use has extended considerably. Yet the market value of tar does not improve much. The use of tar for such an object as road-surfacing could hardly be expected to go forward without objection. The Thames Conservators consider the washings from tar-surfaced roads will prove detrimental to the river and its tributaries; fishermen in the Isle of Wight assert the destruction of rainbow trout through the same cause; and elsewhere—litigation is now proceeding—one cow is declared to have succumbed to the effects of drinking from a stream polluted by washings from tarred roads. The utilization of tar for heating purposes was again broached during the year; and there was a fair amount of ventilation of the subject at the meeting of the Société Technique. The Commercial Sections of the District Associations—the Southern one commenced operations during the year—unostentatiously did much good work during the twelve months. Advantage was taken of the meeting of the Institution of Gas Engineers to hold a conference of all the sections; and it is believed that the result will be the placing of the sections in still stronger position for effective work by the exchange of ideas and information throughout the country in matters of commercial interest and importance. Before quitting commercial questions and bye-products, just two or three words about the British Coalite Company, who are still developing financial responsibilities but comparatively little business; and what business has been done has been of a most unprofitable order. The gas industry is interested in the concern and the system from the two aspects of low-temperature carbonization and competition in the matter of products. The farther the gas industry has receded from low-temperature carbonization, the more prosperous it has become. The latest information about the Company appears in the last and this issue. At that we may leave the venture for the present.

A Blot on the Scene.

A full harvest of discontent, anger, and reproach has been reaped during the year in connection with the promotions, unsound to the very core, of certain City schemers. It is with profound regret that it has to be written in the history of an industry with, formerly, an unblemished name among investors, that it has been made the scene of so much jobbery. The revelations as to the methods of these promoters have been many in the course of the year. Scandalous tales were unfolded in the Amman Valley, Ticehurst, Rawcliffe, and other cases. There has been a crop of concerns before the Courts, issuing therefrom in the hands of receivers. Shareholders are angered at having been the victims of these cute deceivers. Nevertheless, there have

been fresh promotions; and a feverish anxiety has been displayed by the professional company sharpers to rake in still more money from the pockets of an innocent but unwise section of the public. Unfortunately, the Gaslight and Coke Company did not succeed in their appeal to the Courts in the matter of supplying lists of shareholders to company promoters, who purchase small holdings of shares in prosperous gas undertakings for the express purpose of taking advantage of the broadly-worded section in the Companies Clauses Consolidation Act, 1845. The Court held that it was not within its province to go into the motives of these mercenaries. More's the pity. Counteractive measures have therefore been necessary; and there have been widely circulated warnings to holders of shares in sound concerns to avoid new gas promotions until assured of their genuineness. One of the promoting rogues—the man Darby—who had been wanted by the law and had avoided its vengeance for a time, was arrested, and awarded three-and-a-half years' penal servitude. His confederates had previously met their deserts. There is complete agreement with the remark of the Attorney-General (Sir W. S. Robson, K.C.), at the annual meeting of the Bar, that "an attempt will have to be made to deal with the question of the Company law serving the purposes of fraud."

Municipal Administration.

Municipal administration of trading concerns was much in evidence during the year; and largely in connection with the devotion of the profits of lucrative gas undertakings to the aid of the rates. The unsoundness of the principle has been argued again and again; and the correctness of all local government work, other than trading enterprise, being a ratepayers' charge proportionately on a common basis, has been preached. Some alarm was aroused among those authorities who are the worst offenders, on Parliament last session introducing the principle of a limitation of gas profits in aid of the rates at Salford and Oldham (water as well in the latter case), together with the prohibition of free gas for public purposes. The Salford Corporation were so incensed at this interference with the licence in this matter that they withdrew their Bill rather than have to relinquish their freedom in robbing the gas consumers. A Bill of which they gave notice for the coming session has also since been withdrawn, in order to give an opportunity for discussing completely the position with the outside authorities concerned in last session's victory. Many municipal authorities will not—some few do—see that municipal service through trading enterprise should be rendered at the lowest possible price to the community. At Manchester, Mr. J. G. Newbigging, the Corporation Chief Gas Engineer, stood up boldly in defence of his department and of the gas consumers; making the startling announcement that between 1844 and 1909, no less than £2,918,585 had been transferred from gas profits in aid of the rates—a sum that considerably exceeds the total capital expenditure (£2,781,635) on manufacturing and distributing plant. There is no question that it is now felt by the Parliamentary authorities that more rigid control is requisite over municipal finance. This feeling has been engendered by the tremendous growth of the municipal debt, and the amount of the rateable burden, even in those cities and towns where profits of trading concerns are dipped into to succour the municipal exchequer. Meanwhile assessments of all private trading enterprises continue to ascend—where fairly, there is no objection; but valuations made on the part of assessment authorities are too frequently found on the side of attempted extortion.

At the same time, joint-stock enterprise is not allowed to exercise the right of the most humble ratepayer to cast a vote for representation. For this reason, we are glad to see an ever-increasing number of gas company representatives securing seats on the local governing bodies. The ill-fated Mercantile Companies Franchise Bill was introduced into Parliament during the session; but its introduction is about the last that was heard of it. Just one other matter in connection with municipal finance. A Select Committee of the House of Commons considered the question of the availability of municipal sinking funds as sources for exercising by local bodies new borrowing powers; and the finding was that, if properly safeguarded, the proposal was financially unobjectionable. There is a great weight of importance attaching to the words used—"if properly safeguarded." Birmingham gave an opportunity for having a tilt at that objectionable—and to officials personally very much so—practice of discussing in public every small increase of which their Committees think them deserving; but the Gas Committee of the premier Midland city had to give way on this point of reform before the pressure brought to bear on them in the Council. Several feelers in various parts of the country were made regarding the views of ratepayers in the matter of purchasing gas-works; but gas undertakings find protection nowadays in the uncertainty, in the lay mind, as to the future of the gas industry in face of electrical competition. It is well. But it is not where municipal ownership of electric supply has led to the introduction of the system of boycotting gas for public purposes, which is a matter that has, with other questions affecting municipal administration, had consideration in earlier parts of this retrospect.

In Parliament—Changing Conditions.

Though the number of gas promotions in Parliament in the past session was not large, the enactments effected will have a most important bearing on the future of the gas industry. What has been done reflects the changing conditions of the latter, and the changing applications of gas. During the year we have had authoritative figures from Great Yarmouth, Norwich, and Felixstowe, showing that something like 50 per cent. of the gas distributed is consumed during the hours of daylight, and other computations are that 70 to 80 per cent. of the gas used for lighting is now consumed in incandescent burners. The figures are very significant. Illuminating power as a standard of the quality of gas is doomed. It may take time to effect the change, but come it will. The Gaslight and Coke Company, in the settlement of opposition to their Bill, providing for the annexation of the West Ham Gas Company—the first step in a greater project which will vastly alter the geographical face of the Metropolitan Gas Supply—and the reduction of the standard for their illuminating power from 16 to 14 candles, agreed with the County Council to the insertion in the Bill of a standard of calorific power, with penal testing. The dual test is the objectionable feature; but the agreement being made without the intervention of Parliament—without any compulsion on the part of Parliament—it will not be taken as a parliamentary precedent; and the Governor of the Company has protested strongly against it being so regarded. No doubt there will be attempts to make use of the introduction of the test, as was ineffectually done in the case of the Coatbridge Provisional Order. The terms of standard and penalties have been frequently brought to notice; and they do not require reiteration here. There is no doubt that the innovation will assist in hastening the abandonment of the illuminating power standard and the installation of a calorific one, suitable to the conditions of every undertaking. Statements by Professor Frank Clowes in "The Times," and by his Chief Assistant (Mr. J. H. Coste) in a paper before the Society of Chemical Industry, show how near the advisers of the County Council are to the passing-point from one standard to the other. That is hopeful. Complete freedom from illuminating power would tend to make more vigorous the attempts to adapt carbonizing processes to realizing the maximum quantity of marsh gas or methane in the constitution of the gas. The conditions that are favourable to the production of methane have, during the year, been discussed in the "Journal" by Mr. Thomas Holgate. In considering the question of a calorific power standard on the available evidence, it has been suggested in the "Journal," that gas undertakings should clearly refuse to work to a standard exceeding 500 B.Th.U. gross per cubic foot, or be penalized for gas which is not below 450 B.Th.U. gross.

In several Company and Local Authority Acts and Provisional Orders during the session, the illuminating power and testing of gas were fully dealt with. Where there were opponents they soon found their position untenable—Committees making it clear that they were not going to depart from the now well-established practice. The Bury Corporation were allowed to include in their Act a 12-candle standard. In a number of the Bills and Orders of which notice has been given for the coming session, the question will be discussed; and a move of distinct importance is found in the Bill promoted jointly by 47 Gas Companies, under the auspices of the Gas Companies' Protection Association, for the substitution of the "Metropolitan" No. 2 burner for the standard ones at present in use. While on this subject of illuminating power, we may here introduce a reference to the Memorandum issued by the National Physical Laboratory as to the proposed international unit of light, in reference to which reasons were subsequently

advanced in our columns as to why it should not be adopted without very serious consideration as to its merits. A distinct success, for which there has been long fighting, was gained in the past session by the insertion of stand-by clauses in the Heywood and Mountain Ash Acts; and in the same measures, unremunerative slot supplies were also provided for. The Alliance and Dublin Company obtained a many-featured Act; but a peculiar bargain was struck between them and the Corporation in connection with the illuminating power standard and burner, that the price to the consumers during the next triennial period should be governed by the cost of coal—in short, what was done constituted an undesirable (although temporary) amplification of the sliding-scale. Among the several gains, the Company had the old sulphur compounds clause ruled out of their restrictions. Incidentally, it is of interest to notice that the information came to hand recently that in only four States in America are there any regulations in regard to sulphur; and in two of them—Wisconsin and Massachusetts—there has lately been some relaxation. In dealing with municipal administration, mention has been made of the question of the limitation of profits appropriated to the rates in the case of municipal gas undertakings—a matter that on the Salford and Oldham Bills was dealt with respectively by a Committee of the House of Lords and by the Local Legislation Committee of the Commons. The Bury Corporation voluntarily agreed that in their case a moiety of surplus profits should be utilized for price reductions; the other part being handed over to the rates. The revived Daylight Bill came before a Select Committee, who, in view of the difficulty of reconciling several conflicting interests, recommended that legislation on the matter should not proceed. The promoters of the idea have not, however, abandoned their quest. Cincinnati (Ohio) has resolved to set the clock one hour ahead from May 1 to Oct. 1, commencing next year.

Legal Matters.

There have been no gas cases of really first-class importance in the Law Courts this year. The most important ones have had reference to valuation; and primary position in this respect must be given to the appeal of the Edinburgh and Leith Gas Commissioners. The two main issues in the case were whether or not, in arriving at the valuation of the undertaking on the revenue principle, the whole of the expenses of management, or only the portion applicable to a tenant, should be allowed as a deduction from the gross revenue; and whether or not, in allocating the total valuation over the three areas in which the undertaking lies, there falls to be taken into account the value of the land occupied by the gas-mains. As to the first issue, the Commissioners contended that the landlord's expenses of management should be allowed, as well as those of the tenant, and that the value of the land in which the mains are laid should be added to the structural cost of the whole undertaking. The Court was with the Commissioners on the first point, but against them on the second one. In an appeal to Quarter Sessions against their assessment, the Peterborough Gas Company were unsuccessful. Several Companies have on appeal to the Assessment Committees succeeded in composing their differences. The question of the supply of shareholders' lists to Company promoters has been dealt with in a previous place. At Dublin there was an attempt to make the Gas Gompany liable for an explosion of gas resulting after some cooking-stoves had been disconnected. The disconnection was made by one of the Company's men; but he was not then acting with the Company's authority, and, moreover, the jury found there was no negligence on his part in performing the work he was asked to do by someone acting on behalf of plaintiffs.

The Liverpool Gas Company were unfortunate in falling foul of two widows who had stumbled over excrescences in footpaths for which the Company were responsible. The Company were held liable for small amounts of damages for the injuries occasioned. A gas-main was damaged by a steam-roller at Uttoxeter; and the Council had to pay the expense of the repairs, as well as the law costs. The Bristol Gas Company had a passage of arms with the Tramways Company over the extra expenses incurred in connection with the gas distribution system by reason of the existence of the tramways. The Tramway Company are to bear the extra expenses. There were two or three gas workers' compensation cases, but of a character so insignificant as to be hardly worth mentioning. There were four instances of embezzlement—one at Margate, a second at Brentford, and collectors at Sunderland and Chester were found erring. But over these cases a veil may be drawn. Those concerned have suffered, or are suffering still, the awarded punishments; and these stand as a warning. The case in which Mr. William Ewing has preferred a claim against the Greenock Corporation is still pending. In like position is the action in which a farmer is making a claim for the death of a cow, alleged to have been occasioned through drinking from a stream polluted, so it is suggested, by the washings from a tar-painted road. There was, as usual, a crop of cases in connection with illegal connections, stealing gas, and prepayment meter robberies. Some of the sentences passed were exemplary. Looking abroad, the Dessau Retort Company succeeded in getting a confirmation from the German Courts of the judgment of the Imperial Patent Office upholding their patents.

The Labour of the Industry.

There is not much to be said regarding the industry's labour. The line of employment in the industry keeps as level and as high as in most industries; and, as a matter of fact, the industry under its changed circumstances employs more labour than it did under the old order of things. The conditions of employment, too, in regard to pay and privileges, are good. Comparatively speaking, it is a remarkably safe industry; the small number of compensation cases and the small number of fatalities—having regard to the extent of the industry—are the evidences. We hear, too, of few strikes in the British gas industry, which is indicative of an absence of discontent. At Castlebar, there was a strike of stokers during the year, resulting in the town being in darkness; but we have to go abroad for other instances. There were strikes of gas workers at Stockholm and at Rio de Janeiro; but the great strike in Italy overshadowed the others. At the bottom of it were socialistic demagogues and selfishness. Milan, Genoa, Alessandria, and Modena suffered. The strike was resolutely met by the Union des Gaz. The unreasonable demands of the men—demands that were as amusing as they were irrational—were firmly rejected; and the Union des Gaz issue from the struggle all the better for the fight and the understanding with their men.

From strife to peace. The co-partnership system has made big strides during the year. A list of co-partnership companies was published in our issue of Feb. 23 last. To that list we have to add Cardiff, Enfield, Grantham, Ilford, Watford, Wellingborough, and Weston-super-Mare. Then a bonus scheme has been adopted at Carmarthen; and employees are assisted to invest money at the Southend Gas-Works. At Waterford, the men asked for a scheme of profit-sharing; and the Directors arranged to get one into operation before the end of this year. That is what it will come to more generally; if not, then Socialism will grow apace. The Gaslight and Coke Company's scheme was successfully brought into operation during the year; and, with it, the whole of London's gas supply has been placed in the hands of co-partnership gas-workers. At the co-partnership dinner of the South Metropolitan and South Suburban Companies, held under the Chairmanship of Mr. Charles Carpenter, Mr. Charles Hunt made the suggestion as to whether, with co-partnership in all the London works and so many of the suburban ones, it would not be possible to enlarge the annual gathering so as to make it representative of all the co-partnership gas companies in and around London. From all quarters where co-partnership lives, good reports come as to its influences and results. There was not a single exception. At the South Suburban works, a bust of the great pioneer of co-partnership in the gas industry, Sir George Livesey, was unveiled; and an announcement has been made that Mr. Pomeroy's statue of Sir George for the South Metropolitan Company will be exhibited at the Royal Academy next year, and will be erected at the Old Kent Road works in the summer. Only from half-a-dozen places or so did any news come of applications being made for an advance in wages of the workers of one grade or another. These were all in connection with local authority undertakings (probably we do not hear of applications in connection with gas companies' works); and were not of great moment. Refusals in most cases, and compromise in one or two; and the affairs dropped out of sight.

We will only notice two or three general labour points. The Board of Trade issued the regulations governing the procedure of the newly established labour arbitration courts. The gas industry is not very likely—and more especially the

co-partnership section—to trouble these arbitration courts. The President of the Board also published his unemployment insurance scheme, which he suggests should be compulsory and contributory—contributions to be from masters, men, and the State. Revolutionary Socialism, represented by Mr. Will Thorne, the Secretary of the Gas Workers' Union, says that the whole cost should be borne by the State, as in the case of old-age pensions; and he advises gas workers, if the scheme develops, to resist deductions from their wages for the purpose of insurance. Most honest gas workers can do without an insurance scheme of the kind. A report that was issued by the Royal Commissioners on the Poor Law, dealt in one part with the question of labour and machinery, and stated that the Commissioners could not find that machinery caused contraction of labour, but only displacement. An important general matter in regard to labour has been the question of the maintenance of representatives in Parliament by compulsory levies on the members of Trade Unions. It has been declared illegal through the Courts up to the House of Lords; and so anything that is done in this way now can only be by voluntary contribution. The importance, from the Trade Union leaders' point of view, of the levy being compulsory is attested by the carrying of the matter to the final tribunal. Uneasiness has been created in the unionist ranks; and already the Joint Board representing the Parliamentary Committee of the Trades Union Congress, the General Federation of Labour Unions, and the Labour Party, have held a meeting to discuss the situation. Counsel's opinion is to be taken, to ascertain the exact legal position and the best way of dealing with the question generally. It is held by the leaders that, if there cannot be parliamentary representation, there must be a reversion to strikes. But at the present time it seems to us that labour has both parliamentary representation and the power to strike in their hands; and there is no hesitation in making use of both, as occasion dictates.

Special Technical Education.

Diverting thoughts now from matters commercial, administrative, and legislative to those of technical concern, educational matters first claim passing mention. Steps were early taken to give effect to the decision, at the close of 1908, to establish a Livesey Memorial Fund, and to devote it to the endowment of the Chair of Fuel and Gas Engineering at the Leeds University. It was not, however, until the June meeting of the Institution that the President (Mr. Thomas Glover) was able to announce that £10,000 had been reached; and in our issue for July 27 there was published a complete list of subscriptions, amounting to £10,189. There has been no recent information as to whether or not the fund has been finally closed. Early in the year Dr. H. G. Colman gave a series of lectures on gas manufacture at the Leeds University, and Mr. Walter Hole a series on Gas Distribution—both being well attended by students. Arrangements for lectures in the coming term have been made; and in dealing with the subject lately, it was shown in our columns that the projects of Dr. Bone and his colleagues are being framed with the view of making the department of educational service to as large a section as possible of those who are qualifying for official positions in the gas industry. At the Institution meeting in June, there were given, in two papers, the results of research that had been conducted in the laboratories of the department. Most other technical centres at which gas manufacture, distribution, and chemistry have part in the curriculum, have been well patronized by students. So were the examinations in gas manufacture and supply. A large number of students gained certificates; but the examiners—Mr. W. Doig Gibb in Gas Manufacture, and Mr. J. H. Brearley in Gas Supply—were not at all pleased over the large proportion of candidates who presented themselves palpably unprepared for examination. Several gas-works provide facilities for the technical instruction of their men; this being a matter that has frequently come to the front in the course of the year. Technical education had place in various presidential deliverances; and Mr. Corbet Woodall gave expression to his views in an address to the Southern Junior Association. Consider all this, and then the amount of encouragement offered by the Ramsgate Corporation for an accomplished assistant in the Gas and Water Department at 30s. a week!

Work of the Technical Organizations.

Scientific education and the work of the Junior Associations combined must have effect in gradually elevating the character of the work of the technical organizations generally. Looking back over the work of the year—at the proceedings of the Institution, at the quality of the papers before the Junior Associations, and considering also the transfers from the junior organizations (on official promotion) to the senior organizations—it is apparent that there will soon be, insensibly it may be, a change come over the proceedings of the technical organizations. To scan only hastily the great variety of subject-matter that has occupied the consideration of the organizations during the year would occupy more space than we can devote to it. But certain features may be lightly touched upon. It was an excellent meeting that the Institution held in June under the presidency of Mr. Thomas Glover, whose address was of a far-sighted character. He urged greater consideration of the competition that has arisen in the bye-products market, and preparedness for meeting both the immediate and the more remote consequences in the matter of the curtailment of present markets. He also brought before the members the results of the working of his 3 feet deep chamber settings at Norwich, which the members had an opportunity of inspecting on their visit later in the week of the meeting. Carbonization, conveying, and financial questions occupied a large part of the proceedings on the same occasion; and there was also much interest evinced in the papers from the Leeds University, detailing the progress of the gas-heating research, and giving an account of investigations on calorific value and mantle efficiency. The District Associations contributed largely to the technical pabulum of the year; and the output of the Junior Associations was somewhat remarkable. Some of the papers could indeed with advantage have been curtailed. But at the same time, it has been pleasing to see the broad and enlightened view taken of the affairs of the industry by the members.

The Society of British Gas Industries had a successful year, under the presidency of Mr. Thomas Newbigging. The value of co-operation, and the relations of engineers and contractors, were subjects upon which the mature wisdom of the President was brought to bear in his addresses to the members. In collaboration with the Institution, a model set of contract clauses (which are generally voted as acceptable by the contracting parties) have been formulated. In connection with the subject of gas-heating (which is very much to the front now) a paper of exceptional merit on the smoke nuisance was contributed to the proceedings of the Society by Mr. C. E. Brackenbury. The Illuminating Engineering Society publicly inaugurated its work with an eloquent and instructive discourse by Professor Silvanus P. Thompson. Within view of our readers were brought the proceedings of the French, German, American, and Victorian Gas Associations. Perhaps we may be allowed to single out from the technical literature from abroad the meritorious research contributions to the American Gas Institute from the Illinois Gas Association upon the compression and transmission of gases. But with all this technical organization and discussion, the question has been asked, so far as the home industry is concerned, Is existing organization complete and effective for all purposes? The matter was discussed in the "Journal" for July 20. The President of the Institution (Mr. James W. Helps), speaking at the autumn meeting of the Midland Gas Association, stated that he was not at all satisfied that the organization of the industry was what it ought to be; and he hoped to make a suggestion during his year of office to the end of increasing the usefulness of the Institution. In concluding this hasty glance at the work of our technical organizations, let us apply to it simple but expressive words from the presidential address of Sir J. J. Thomson to the British Association: "There were never any signs of an approach to finality in science. As we conquer peak after peak, we see in front of us regions full of interest and beauty. But we do not see our goal; we do not see the horizon. In the distance tower still higher peaks, which will yield to those who ascend them still wider prospects."

Carbonization—Technical Developments.

In the forefront of technical consideration throughout the year has been the question of carbonization. Economy lies not only in direct actual savings, but in increasing product from any source of useful output. While in the utilization of gas, work has been successfully directed to the production of greater efficiency from appliances, vigour has been applied to the realizing of a greater yield of gas per ton of coal carbonized. The simplest means of doing this are avail-

able in the heavier charge, and the longer duration of carbonization. The paper of the year upon this subject was contributed to the Institution meeting by Mr. J. Ferguson Bell. From all quarters of the country have come reports of the successes from the application of the method—of resulting economy in coal, of increased makes of gas per ton, and of other beneficial concomitants. The final of the classical writings of the late Mr. William Young on the subject of carbonization were published by us early in the year. They dealt with a projected system for the better conservation and more economical utilization of heat in carbonization, in connection with which was combined a process by Mr. John Hammond for partially purifying coal gas by conjoining the production of caustic ammonia for the purpose of manufacturing sulphate from ammoniacal liquor. The vertical retort maintains a large place in the thoughts of gas technicians; and added attention was bestowed upon the rival intermittent and continuous systems by the installation of the Dessau bench at Sunderland, the Woodall-Duckham benches at Kensal Green and Burnley, and by the description of, and results secured from various coals carbonized in, the Glover-West settings at St. Helens. The features and results are present in the minds of all interested readers; and they need no recapitulating here. There was much controversy among our Continental friends as to the relative advantages of the admission of steam into vertical retorts and the production of water gas in some independent plant. Views in this country rather side with the disputants who hold the latter opinion. Coke-oven and chamber setting work were kept well to the front in our pages; Dr. Lessing's account submitted at the Gas Institution meeting as to the position occupied by chamber work on the Continent forming a valuable contribution to the literature of the subject through the compendious treatment of the facts. Chamber settings for gas-manufacturing purposes have not as yet found favour in this country, excepting the chambers of restricted scale that Mr. Glover has put in at Norwich. The reasons are too extensive for review in a retrospect. Following on Mr. F. W. Bywater's 1908 Institution paper, a Committee has been formed, with Sub-Committees representing various interests, to consider the subject of refractory materials. One of the Sub-Committees represents the gas industry. Mr. W. R. Herring has suggested that the Committee should collect data as to the causes affecting the durability of retorts, so as to enable a fair and impartial judgment being arrived at regarding the relative merits of British and German retorts. Controversy was reopened on the subject during the year by the announcement of Mr. Charles Carpenter that the South Metropolitan Company had given out an order for retorts to Germany, on the score of quality, and not of price. The Refractory Committee set to work at the close of the year collecting information that would assist them in their labours.

It cannot be said that new constructional work at home has been of large magnitude during the year, though our pages have, as usual, been enriched by illustrated descriptions of reconstruction and extension work. We will not enumerate them; they cover all parts of plant from retort-settings—horizontal and vertical—to the new gasholder tank at the Bradford Road works of the Manchester Corporation, to accommodate a 10½ million cubic feet holder, the 3½ million Gadd and Mason spiral-guided holder at Newcastle-on-Tyne, and the 1 million four-lift spiral-guided holder at Montreal. The plants described have also included some instances of Continental work; one highly interesting article coming from Melbourne. We must not omit to acknowledge the immense interest that attached to the unique series of illustrated articles contributed to our columns by Mr. Maurice Graham, during the progress of his trip round the world. They brought British gas men into closer touch with the men, the practices, and the difficulties of the gas industry in far-off lands in a manner that had never been done before.

Associated with processes other than carbonization, it is of interest to note the use of a pulsometer (whereby water is saved) for quenching coke, as well as the "Charco" system of dry quenching, both of which were described in our columns. There has been renewed interest in purification. Revived was the question of purification by means of ammonia in the posthumous articles of Mr. William Young, in which system Mr. John Hammond is concerned. The greatest novelty in actual being is the Feld plant at the East Hull Gas Company's works for the elimination of sulphuretted hydrogen and the recovery of sulphur as a by-product. The functions of the plant, as Herr Feld showed in a special article in these columns, have been extended to the extraction simultaneously of ammonia and sulphuretted hydrogen, with the oxidation of the latter into sulphuric acid. There has also been described the "Burkheiser" process of purifying the gases of dry distillation with the simultaneous production of sulphate of ammonia, without adding any acids. The proposals are attractive; but there is a desire for further actual working information. This outline of work shows the active quest for greater economies in the processes of gas manufacture.

In regard to the distribution department, glancing through the records of the year, it is noticeable how largely the use of steel mains is spreading, and how considerably, throughout the world, high pressures are being made use of in the conveyance of gas. American tests on the corrosion of steel and wrought-iron pipes led to the conclusion that good modern steel is more resistive than wrought iron. One feature of parliamentary work has connection with gas-mains, owing to the unreasonable depths to which road authorities, in view of the steam-roller, seek to enforce the laying of pipes. An instance is found in the Aldershot Act of the session. Much information on the subject of electrolysis has come to hand from America during the year.

Official Changes.

The official changes of the year have been numerous; and to chronicle them all in this retrospect would be an unnecessary work, in view of the fact that they are so easily referred to in the indices to the quarterly volumes of the "Journal." Thankful are we to be able to say that the vacancies that have occurred, and have made places for promotion, are not all due to death. Several well-known men have relinquished office after long careers of loyal service, and thus have opened the way to promotion in the official ranks. All who have secured appointments that have bettered their place in the work of the industry, however high or however low, have our heartiest congratulations and good wishes. A popular appointment in engineering circles was that of Mr. W. Doig Gibb to the Chief Engineership of the South Metropolitan Gas Company; a fit successor to his work at Newcastle being Mr. T. Hardie. Upon Mr. Henry Sutton Reeson was conferred the Chief Distributing Engineership of the Gaslight and Coke Company. Mr. G. Thornton Andrews succeeded his father at Swansea. A number of gentlemen who had previously occupied junior positions gained places of full responsibility. Gas officials should make good Directors; so thought the Board of the Brentford Gas Company when they selected Mr. D. Milne Watson, the General Manager of the Gaslight and Coke Company, for a place on the directorate, so thought too the Board of the Ilford Gas Company when they welcomed their late Engineer (Mr. A. A. Johnstone) to their counsels. Among the resignations of the year were: The veteran Mr. Charles Nickson, from the Superintendentship of the Manchester Corporation Gas Department (his successor being his well-tried assistant, Mr. F. A. Price); and Mr. G. F. L. Foulger (under circumstances well known), from the Chief Engineership of the Distributing Department of the Gaslight and Coke Company. Other retirements from engineership or secretaryship were: Mr. C. E. Ball, of Ilfracombe; Mr. Alexander Bell, of Dalkeith; Mr. William Cash (appointed Director of the Bournemouth Company on resigning the Secretaryship, to which Mr. H. A. Plumb succeeded); Mr. John Laycock, of Keighley (retained as Consulting Engineer); Mr. Henry Morley, of Cardiff (succeeded by Mr. H. D. Madden); Mr. W. A. Padfield, of Exeter; Mr. W. H. Pearson, of Toronto; Mr. J. W. C. Pennington, of Colwyn Bay; Mr. C. P. Poole, of Madeley, Salop; Mr. E. C. Riley, of Swindon (G.W. Railway); and Mr. William Smith, of Bolton (who is succeeded by his son, Mr. William J. Smith).

The Ceaseless Hand.

There is a disposition to postpone to the end the most regretful parts of the annual task. Through the portals of the vast and mysterious eternity, there have passed, during the year, some who have been near and dear to many of us, and several who have occupied places in the administrative, technical, and manufacturing work of the industry both at home and abroad. We will not stay to discriminate position, or give precedence in mundane rank. Death levels all men. Mention of some of the names will suffice to those who knew the men to, in memory, place them in the scenes of former activity—scenes in some cases (through retire-

ment) not of the immediate past. Here is the roll in alphabetical order: Mr. G. Hampton Barber, Mr. Thomas Bull, Mr. Josiah Chandler, Mr. John Clark, Mr. T. J. Cotton, Mr. John H. Cox, Mr. A. C. Craven, Mr. James S. E. Drory, Mr. R. S. Field, Herr Adolf Graetz, Mr. John Hutchinson, Mr. George Keyte, Herr Aug. Klonne, Mr. Matthew Leaf, Mr. F. H. Lester, Mr. Joseph Mackay, Mr. George Malam, Mr. John Marsland, Mr. John Meiklejohn, Mr. D. Coates Niven, Mr. James Pye, Mr. Alfred Richards, Mr. George Smedley, Mr. John Tindall, Mr. W. A. M'Intosh Valon, and Mr. J. Walker. Among those who held prominent positions on directorates may be mentioned Sir John Baker, Sir J. Colomb, Sir Edward Lawrence, Mr. Richard Laybourne, Mr. J. Spencer Phillips, Alderman S. Lee Rymer, and Mr. Howard Charles Ward. Loved in life and memory by all who knew her, Lady Livesey was laid to her final rest with Sir George in January—only a few weeks separating the two in life.

Accidents, and Otherwise.

Considering the extent of the British gas industry, fatal accidents in it are comparatively few and far between. But the year has been marred by some terrible disasters abroad. There was the Messina earthquake with all its tragic consequences, among them being the death of the Manager of the gas-works, his family, and a number of the workmen, together with the partial wrecking of the works and distribution system. There was the lamentable explosion at the Geneva gas-works, whereby several lives were lost, and a tremendous wrecking of gas-works property occurred; but we are still awaiting the official report, which, it is hoped, will clear away assumptions, and give the industry a positive explanation as to the cause. At Hamburg, there was the great fire, spreading appalling destruction to life and property around, through the accident to the new 7,060,000 cubic feet holder built on the raised tank plan with vaults beneath. The information to hand is all fresh in memory; and here again the official inquiry is being awaited with interest. Injuries to workmen were occasioned at Adderley Street works, Birmingham, and at Hanley Gas-Works, through mishaps in the course of purifier operations. It is time consideration was given to a method of clearing residual gases out of purifiers before being opened. We should then hear less of gassings and casualties than now. All told, we only had to record ten other fatalities on gas-works or in pipe-laying operations. Other accidents on home gas-works were so trifling as not to be worth mention. The Factory Department of the Home Office issued a memorandum recommending that the employees in works where water gas is made should have special training in first aid, consisting primarily in the prompt administration of oxygen and warmth and in artificial respiration in cases of danger. During the year, only one fatality was reported in our columns in which water gas was directly involved. That was at Lausanne, where a workman was poisoned by carbon monoxide while engaged cleaning out a superheater. The destruction of the Clacton Flour Mills (causing an estimated loss of some £8000) was attributed to a suction-gas plant; and intelligence of one or two cases of poisoning through such plants reached us.

The explosion in the Grange Road, Bermondsey, when three lives were lost, was occasioned by a concatenation of favourable contributory conditions: A water-main was broken, the support was washed away from a gas-pipe, fracture followed, and a derelict sewer served as a store for the accumulation of an explosive mixture. The question of responsibility has been discussed; but in the result the London County Council, the South Metropolitan Gas Company, and the Metropolitan Water Board have joined hands in settling the financial matter. Most gas explosions are caused by gross carelessness. A post office employee descends a shaft, in which he has previously noticed gas, with a lighted candle. Consequently an explosion occurs near Blackfriars Bridge; and the whole world hears of it. An owner of a house near Hayes smells gas for days; the warning goes unheeded. An explosion occurs; and the whole world receives intimation of it. Nine or ten gas explosions were recorded during the year; unfortunately, with fatal results in two or three cases. A steam-roller working at Plymouth caused a gas-leakage, one effect of which was the death of a woman. A big explosion was caused at Manchester through the fusing of electric wires and gas-pipes; and a round dozen electric light box explosions were recorded in our pages in the course of the year. But these probably were only a few of the actual occurrences. A couple of chandeliers were responsible for suffocations, which remind of the excellent work done in free conversion of these unsafe antiquities by the South Metropolitan Gas Company. There were 45 cases of suicide by gas and even one of murder in the course of the twelvemonth. This state of things Dr. Waldo, the City Coroner, attributes to the increased difficulty in the way of purchasing poisons. Other cases recorded of gas poisoning number 35; and these may generally be said to be due to carelessness and defective fittings.

The Future.

This ends our review of the year now nearing its close. The impression that rests upon one, as a general survey is made of what has been written, is that the industry is largely gaining in strength by its own internal and technical progressiveness. The industry itself is old; but its methods and services are distinctly modern. And the daily accretion of experience of those modern methods and services accentuates perception as to the destiny of the industry. This being so, let one and all engaged in its work go forward with the fervent desire to do the best possible to contribute to the well-being of its future. With the sense of individual responsibility upon us, supported by activity, much can be done. In the spirit of these thoughts, sincerely do we wish all our readers

Happiness and Prosperity in the Coming Year.

Advantages of Co-Partnership.

It was an excellent address that Mr. W. H. Lever, M.P., recently delivered to the Woolwich Chamber of Commerce on the subject of profit-sharing; and his remarks assume even greater value when it is considered that he spoke from actual experience. Theory is all very well, and, of course, for the starting of new ideas, there is nothing else to be obtained; but now it is to established successes that co-partnership looks to secure still wider adoption. In the first place, Mr. Lever divides the forces that go to production into three—Capital, Labour, and Management, and not merely the two former, as is often done. The three, he rightly points out, must, if any good is to be done, work together, to one common end, on lines of enlightened self-interest, and not on the lines of narrow personal selfishness. To this end, he adopted in his own business a scheme of profit-sharing consisting of the issue of partnership certificates which would receive dividends at the same rate as the ordinary shares of the Company, less 5 per cent. Thus, if ordinary shares received in any year 10 per cent., the certificates would get 5 per cent. If a workman wishes to be on exactly the same footing as the ordinary shareholder, he can go and buy 5 per cent. preference shares on the market, pin his preference share certificate to his partnership certificate, and the 5 per cent. he gets on the preference shares, added to the dividend he receives on his partnership certificate, will make him rank for dividend the same as the ordinary shareholder, but with the advantage of better security. Mr. Lever created £500,000 partnership certificates; and though they do not represent cash, he has been assured by brokers that they would readily sell at par value, with the conditions attached to them, if they were on the market and saleable—which they are not. The rule which has been followed is to issue an amount equal to 10 per cent. of a man's or woman's salary or wages of these partnership certificates each year. Both sexes are qualified to become partners when 25 years of age, after five years' service with the firm. The certificates can be cancelled through wilful misconduct, or if the holder voluntarily leaves the Company's employ; and for these two reasons only. If his health breaks down, and he leaves, or if he arrives at the age of 65, partnership certificates are then exchanged for preferential certificates; and, assuming that the partnership certificates have been receiving 10 per cent., the preferential certificates receive 5 per cent. for the remainder of the holder's life. If he dies, they are transferred to the widow for the remainder of her life. If a man dies while in active service with the firm, his partnership certificates are transferred to the widow on the basis of preferential certificates. This scheme Mr. Lever believes promises well for the employer because it gives to the employee freer scope for the exercise of his abilities, and makes him a better man; the worries and cares of management ought also to be relieved by it; while to the employees it offers a ladder by which

to raise themselves out their present troubles and difficulties. No hint at any failure so far, in any direction, is to be found in the address; so that Mr. Lever's scheme may be regarded as one more instance of the successful application of profit-sharing principles to industrial undertakings.

"Good-Bye."

Though at the conclusion of the final meeting of shareholders in the West Ham Gas Company on Tuesday last, the Chairman (Mr. J. Lister Godlee) bid those present "Good-bye" so far as that Company is concerned, he did not do so in any other sense; for he is in hopes of meeting them often in future at the half-yearly gatherings of proprietors in the Gaslight and Coke Company—of which he has been elected a Director. On the 31st inst., the West Ham Gas Company will cease to have a separate existence, and will become part of the undertaking of the Gaslight and Coke Company; and last week's meeting was held in accordance with a previous promise that the Board would take an opportunity of laying before the shareholders an account of the proceedings during the intervening period. There were no accounts to be presented; and there was no dividend to be declared. A statement of accounts for the present six months will, however, be prepared by the officials in due course, and distributed by the Gaslight and Coke Company together with a statement as to the proposed dividend. The nature of the information which the Chairman was able to give his audience was such as they have been well accustomed to—namely, that during the past five months the business of the Company has made steady and satisfactory progress, the sales of gas having been nearly 6 per cent. more than those in the corresponding period of the previous year. But it may be said that the chief interest of those present centred in an interesting account of the origin and early days of the undertaking, which was given them by Mr. Godlee. From 1846 to 1909 is a far cry; but this is the length of the existence of the West Ham Gas Company. An Act of 1856 incorporated the Company, which had then a capital of about £14,000, with £13,000 more borrowed; while the capital to-day is £1,441,000. In 1860, the quantity of gas sold was 53 million cubic feet; and this figure has now increased to 2007 millions. Along with this growth, the price of gas has naturally been reduced; so that there has been gain all round. The Chairman stated that he wanted the proprietors to feel proud of the Company; and this is a desire about the attainment of which there should be no doubt, when the brilliant record of the undertaking is considered. It is gratifying to note that a full share of credit was given to the officials for the part they have taken in making the undertaking a success; and the proprietors will rejoice with the Board that the financial arrangements have permitted of tangible recognition of these services being made. The complimentary remarks which were passed with regard to the work of the Board—particularly that of the Chairman—were also unanimously felt to be thoroughly well deserved.

Wiping Out Competition in Buenos Ayres.

From Saturday next the gas supply of the City of Buenos Ayres will be under one administration; debenture holders and shareholders of the three great Gas Companies—the River Plate, the Buenos Ayres (New), and the Primitiva—having agreed to amalgamate. By the Chairman of the last-named Company (Mr. H. E. Jones) there has been, at the meetings for some years past, insistence on the policy of consolidation being the correct one; and in the extremity of their difficulty with the Municipality, the other Companies have subscribed to the wisdom of this. The several meetings—there were five of them—at which the debenture holders and shareholders of the Companies unanimously passed the provisional agreements were held last Tuesday; and, as far as possible in our reports of the proceedings, we have abstained from reiteration of information given at the preceding meetings. Gas supply in Buenos Ayres has been in a constant state of disturbance as long as the oldest administrator of any one of the Companies can remember; and (to meet the demands of the Municipality) the only course to a peaceful solution of many differences, including a cheaper supply of gas to the citizens, lay in the economies to be achieved by supplanting competition by a common and single interest. The history of competitive gas supply has repeated itself in Buenos Ayres; the competition has not been to the advantage of the citizens. It has, though carried on in friendly manner, caused the service of gas to be a more costly matter than it need have been if the greater outlay—waste, we might say—necessitated by competition had not been incurred. But competition has come to an end; and, under the new conditions, it will be supremely interesting to watch the developments of the future. The debenture holders and shareholders in all the Companies have had their interests fully safeguarded in the scheme for the fusion of interests. What has been done is as popular with them as it is in the stock markets, where there has been a good appreciation of the prices of the stocks and shares. It is recognized on every hand that certainty for at least twenty years takes the place of the old uncertainty; and this is worth much. Of the consolidated Company, Mr. A. E. Bowen (the Chairman of the River Plate Company) is to be Chairman; while the Chairman of the old Primitiva Company (Mr. H. E. Jones) and the Chairman of the Buenos Ayres Company (Mr. J. C. im Thurn) will be Vice-Chairmen. At present the management will continue much as now; but eventually centralization of the executive and technical work will no doubt take place, with consolidation of staffs. Some of those holding office at present will ultimately have to go; but we feel sure there will be liberal compensation in store for them. The Secretary of the enlarged concern will be Mr. J. M. Macmorran, the present Secretary of the Buenos Ayres (New) Company.

Coalite Working Costs not Known.

Before such ardent worship of the coalite process, and such fervent belief, as was witnessed by the shareholders of the British Coalite Company when Sir William H. Preece, K.C.B., F.R.S., was addressing them last Tuesday, all criticism if it be not favourable must pale. No profits have as yet been earned by the Company, no profit and loss account of working has as yet been made up, and the long period since the Company started has been devoted to transforming the plant, and to experimental work only. But such is human prescience that Sir William was able to say that the Company "have turned the corner," and are "about to enter the profit-making stage!" Happy thought; unhappy will be the Directors if they have to appear before the shareholders a year hence with a balance-sheet showing conclusively that the process is an economic failure! The experimental and development stage will not be a creditable excuse much longer. The Chairman's explanation of the apparent loss on the sales of coalite and bye-products, when the receipts are compared with the cost of coal, &c.—amounting to £16,326—was a work of art. If we construe his words rightly, the accounts are merely a chaotic representation of the financial position of working during the experimental and constructional period; and the statement of receipts and expenditure must not be taken to be in any way a profit and loss account. That is the interpretation of a statement in Sir William's address; and to it there has to be added another appearing in the final part of his reply to shareholders' inquiries. He said: "I was asked if we are making a profit at Plymouth; but the fact is we have not yet made a profit and loss account in connection with any of the works." Whence then comes the confidence for the statement that the Company are about to enter the profit-making stage? According to Sir William's admission, the Directors and their technical advisers cannot know whether or not they have in hand a profitable system. We have before said that figures that have been published regarding the working of the system are incomplete; and Sir William in what he says supports the assertion. But why has no profit and loss account of working been made out yet? seeing that the Chairman asserts that coalite is being produced at the rate of 400 tons a day, which represents the carbonization of a much greater quantity of coal than that. Surely that is a sufficient scale of working upon which to have tested the financial aspect of working.

Coalite Gas and Gas Undertakings.

The Chairman's speech was constructed in a manner that did not hang well together. He is very sanguine; but no profit and loss account of working has been evolved. He excuses the position, and discounts his confidence, by declaring that the coalite industry is still a new one, based on novel scientific principles. Novel and scientific principles! An excellent phrase truly for a meeting of fuel consumers, but not for expert fuel producers. Perhaps Sir William has not heard of the use of small iron retorts

in the early days of the gas industry, and of the carbonization in them of light charges of coal at low temperatures. But though there has been all this delay, we have his word for it that no difficulty has arisen that has not been easily surmounted. Why then so much delay? A shareholder appeared to be mystified over finding that the offer such as that represented by the Plymouth terms had not been widely "considered," and adopted by gas companies generally. Another shareholder put the pertinent question as to why the Gaslight and Coke Company "were allowed to make carbo, if it was so much like coalite. Moreover if carbo could be supplied, why not coalite?" The Chairman skipped with remarkable agility over these awkward points. The process has been well considered by gas companies; and interesting efforts were made to land some big fish to freshen up things a bit before this meeting of shareholders. But there was failure of the effort. The Plymouth and Hythe installations sum up, as they did some time since, the only gas-works on which there are installations of the plant. If gas undertakings must use small iron retorts, low temperatures, light charges, and short-hour carbonization, there is absolutely nothing to prevent a reversion to the conditions of the early days of the gas industry. Sir William's short answer to the shareholder might have been that there is really nothing in the way of gas companies turning out material, if they feel so disposed, precisely similar to that produced by the Coalite Company. As the Chairman confessed, the Gaslight Company, "with their existing plant," are able to obtain something that is not very unlike coalite when burned as a fuel; but in saying this he went too far, and so added "it is infinitely inferior." It was stated by one speaker at the meeting that the Plymouth terms are still open to gas companies. If this be so, what has induced the Board to alter the decision of a year ago? when the then Chairman (who has since retreated from the Board) stated that—such, before the shareholders, was his confidence in the process—no other gas company need apply for the provision of plant on the Plymouth terms. It is not a case of gas companies wanting the Plymouth or any other terms. It is a case of the Coalite Company wanting gas companies to take up their system.

An Extraordinary Idea.

If gas engineers are so bold as to think they have nothing to learn from Sir William Preece about coal carbonization, and about the best quality of gas they require, they are, in the opinion of Sir William, much mistaken; for he says that coalite gas is something with which they can improve the quality of ordinary gas, it is something that can be put into the gasholders at 25 per cent. less than gas undertakings can produce a lower quality of gas for (where are the proofs of this?); and—pray ponder over this—the Company will soon be able to produce at Barking sufficient gas to develop power, and, "we hope, to supply local consumers with gas for the enrichment of their own gas." If the shareholders understood what Sir William meant by this, they know something as to gas affairs with which we are not acquainted. Even if the local "consumers" wished their gas to be enriched (which they do not), how Sir William is going to get the coalite gas to the consumers, and how the consumers are going to apply it, are mysteries; but the explanation will perhaps make interesting subject-matter for next year's address to the shareholders.

Quality of Coal Important.

There is one thing certain about the coalite system, and that is that just any variety of coal is not going to give satisfaction to the consumers of the resulting partially carbonized material. The coalite seems to vary. One shareholder stated that he had, on two or three occasions, reported to the Secretary the "stony" character of the coalite supplied to him, but he was glad to say the difficulty had been "to a great extent" (which does not mean entirely) removed. Another shareholder spoke approvingly of coalite; but he, too, had noticed some time ago a tendency to issue "splinters." Shareholders might be a bit careful over their expressions. In his reply on this point, the Chairman acknowledged that there had been considerable variation in the quality of the coalite manufactured; but this was due quite as much to the difference in the quality of the coal as to the differences in the mode of carbonizing it at the different works. This means that there must be care in the selection of the class of coal used in producing coalite. However, "we are gradually finding out these difficulties," which may be interpreted to mean that Sir William anticipates the discovery of a few more. In this, probably, he is not far wrong. But Sir William's speech fell very flat. It was far too thin for the purposes of a Company in the position of the one over which he presides and prophesies, though the Stock Exchange has been using it in an effort to rally a little interest in the shares of the Comp any and of the parent Syndicate.

New Mining Arrangements in the North.

It might have been thought that South Wales, having had six months' experience of the Mines Eight Hours Act before it came into force in the North of England, would have settled all the points that could arise as to the operation of this product of an up-to-date beneficent Government. Some questions have been settled—in one way or another. But different difficulties arise under different conditions; and from discussions which have been going on in Northumberland and Durham, it is clear that those fields are confronted with troubles of their own. On the first of next month, the Act comes into force in these districts; and early last week it was stated that there was little hope of the owners and miners of Northumberland coming to any settlement as to arrangements for working under it. Fortunately, wiser councils prevailed later on; and at the close of a meeting between the parties on Wednesday, it was announced that a provisional agreement had been adopted, subject to confirmation by the county, and that there would be a special meeting of the Council of the Northumberland miners, when the terms of the agreement would be laid before the delegates. In Durham, it seems, the owners' representatives and the Executive Committee of the men signed an agreement without the county being consulted; and this led to some feeling of dissatisfaction on the part of the men. But it may be hoped serious friction will be avoided—especially if, as Mr. John Wilson, M.P., says, "the balance of advantage is very largely in the men's favour."

A Municipal Superannuation Suggestion.

A suggestion which will have a close personal interest for a large body of employees—and an ever-growing body, too, it may be added—is contained in a paper which was read at the recent meeting of the Institution of Municipal Engineers. The author was the President of the Institution, Mr. John T. Pegge, the City Engineer and Surveyor of Durham; and what he had to say on the subject will be found set forth in another column. It is not the first time, if we remember rightly, that Mr. Pegge has constituted himself the champion of the municipal employee in this way; and no doubt there is a great deal of truth in what he says. Nevertheless, it seems somewhat doubtful whether such an universal scheme of superannuation in connection with municipal servants is likely to come into force in the near future. The principles which he advocates in his paper are (1) the payment of full wages during certified illness up to sixty-five years; (2) half-wages during life after sixty-five, unless previously retired; and (3) half-a-year's wages at death, paid to the legal dependants. He also remarks that "in any scheme provision should be made for an employee's continuance of service from one authority to another"—thus, of course, making the system a national one. It is pointed out by Mr. Pegge that what is being attempted is no innovation, and that in addition to pensions already granted to various public employees, great bankers and other high financial companies apply the system to those in their service. All this may be admitted; and yet it may be said that, if Mr. Pegge's national scheme is adopted, the municipal employee will be envied by many of those whose life-work is in connection with private undertakings.

Illegal Levies.

During the past two years or so, there has been before the Courts, in one form or another, the question of the legality or otherwise of the maintenance of Members of Parliament by Trade Unions out of their funds; but the point has at last been settled by the House of Lords, who have unanimously decided that the Amalgamated Society of Railway Servants were wrong in their contention. In other words, they declared to be illegal the rules of the Society which had relation to the formation of a fund for the support of Members of Parliament. In this judgment, the House of Lords are affirming the decision of the Court of Appeal, who had arrived at a contrary conclusion to Mr. Justice Neville.

In the first instance, that is to say, Mr. Osborne, the Secretary of the Walthamstow Branch of the Society, was refused an injunction to restrain the Society from making compulsory levies for purposes of parliamentary representation; but this decision has now by both of the higher tribunals been held to be wrong. No great amount of upset has been caused by the judgment of the House of Lords. The Labour leaders themselves have taken the matter so calmly as to lead to the supposition that the decision did not come quite as a surprise to them. There is really nothing extraordinary in this; for there is pretty general agreement in the fact that the Trade Unions were not originally started with the idea of becoming political organizations. It is only of later days that efforts have been made to increase their sphere of action in this direction—which entailed either additions to, or alterations of, the rules. These new rules were, it is true, registered; but, being otherwise invalid, this was not sufficient to give them validity. Lord Macnaghten pointed out that there was nothing in the Trade Union Acts from which it could be inferred that the Unions were meant to have the power of collecting and administering funds for purely political purposes. Therefore, it may fairly be assumed that the only method of bestowing such power is by the passing of a further Act; and this is what the Labour Party already have in view. It will be time enough to consider this Bill when it happens to come along; but meanwhile, on the matter as it at present stands, cordial agreement may be expressed with the remark in Lord Atkinson's judgment, "that it would be unjust and inexpedient to compel members of Trade Unions by altering the rules to contribute to the promotion of a political policy of which they might disapprove, or else be expelled from the Union and lose the benefits from the money subscribed." Voluntary levies are obviously the fairer method of procedure.

Personal.

Mr. HENRY FOWLER, formerly Gas Engineer to the Midland Railway Company, has now been appointed Chief Mechanical Engineer—*i.e.*, head of the Locomotive Department—one of the highest engineering positions in the kingdom.

Electrical Misrepresentation.

"Meteor" of the "Electrical Times" is a good hand at misrepresentation and at displaying great personal ignorance on gas matters. Included in his notes this week in the columns of our contemporary is the reproduction of a photograph after the roadway had been opened by workmen the other day near Blackfriars Bridge, to deal with the escape of gas from a large main, through a fault developing owing to the great disturbance of the subsoil in connection with the passenger subway construction there. Under the picture is the line "The Gas Explosion at Blackfriars." The picture shows heaps of soil the result of the excavation necessary to deal with a main of such large diameter as this one. From the descriptive line, one would imagine the soil had been blown out of the ground by the explosion; whereas the explosion itself took place in the Post Office system and the neighbouring electric light culverts and boxes, through the use of a lighted candle by a Post Office man, though (according to the reports) aware of the presence of gas. Immediately after the explosion, and until workmen came on the scene, the roadway was undisturbed. In a note on the occurrence, "Meteor" remarks: "The accompanying photograph shows the effects of the recent explosion near Blackfriars Bridge. *The picture is not all that it might have been; the original mound of earth would have been far more imposing.*" The statement, and what is intended to be inferred, are deliberately untrue. Dealing with the terrible fire in South London, which is ascribed to electrical origin, "Meteor" does not fail to mention that the premises were equipped with gas as well as electric light; and a few sentences lower down he remarks: "The gas men were still *sawing away* pipes after eleven. When one remembers how assured is the doom of a large building with *persistently flaming gas-pipes* all over it, it seems deplorable that *no means of rapidly isolating from the street mains can be devised.*" We will not comment on this lest we hurt "Meteor's" feelings. In another note on the Board of Trade gas undertakings returns, he says: "The advocates of gas proclaim its incontestable superiority for street lighting. If they can gain any support for this view from the fact that during the past twelve months the number of public gas-lamps has dropped by 10,000 odd, they are welcome to it." In our issue a fortnight since, the correction of this mistake in the returns appeared, in these words: "In the preceding returns, there was an error of 10,000 in the public lamps credited to the companies, whereby there appeared to have been an abnormal gain for one year. The figure for both companies and local authorities should have been 690,264; and this has been increased during the year to 700,696—the difference representing an addition of 10,432, of which 4964 have gone to the account of the companies, and 5468 to that of the local authorities."

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 907.)

SHORT and sweet was the week which ended with Christmas Day, so far as the Stock Exchange was concerned. As a general rule, this period is dull and apathetic, only awaiting the prospect of a revival of business when the inevitable festivities are over. But last week took a turn of its own, and developed a tendency so distinctly cheerful and buoyant as fairly to arouse the markets from their soporific preparations. A gratifying point was that the strength lay in the high-class departments—Home Government and Railways—which had had a rather poor time the week before. Of course, business was not at high pressure, and the weight of operations was not sufficient to tip the scale of prices largely; but such as it was, it was a force in the improving direction. It was scarcely marked at all on the opening day; for business was very quiet, and there was not much movement. But the gilt-edged division showed great steadiness, and Railways even made some very fair advances; while certain of the more sensitive markets kept up nicely. The favourable tone was considerably accentuated on Tuesday, and business became more active. Home Government issues were strong, Consols advanced $\frac{3}{16}$, and Railways advanced as good traffic returns inspired courage. Other markets also followed suit, although Americans shrank in obedience to a touch from New York. Wednesday was another cheerful day. The gilt-edged division, aided by easier conditions in the Money Market, were still in good demand; while Railways kept edging-up still. Consols gained another $\frac{1}{4}$. On Thursday, things necessarily began to quiet down; and by the close of the day the week was practically almost at an end. The choicer departments continued to hold themselves firm; and there were very few weak spots anywhere. In the Money Market, there was a marked easing from the rates of the week before. Business in the Gas Market was at a holiday level; but there was a nice firm tone about everything that was touched. A noteworthy jump up was made by Brighton and Hove. West Ham now drops out of the quotation; and after to-day it will disappear from our list, as it becomes absorbed into the Gaslight and Coke Company on Jan. 1. The ordinary stock of the latter Company was done at from 103 to $103\frac{3}{4}$—a rise of $\frac{1}{2}$. In the secured issues, the preference marked $104\frac{3}{4}$, and the debenture $83\frac{1}{4}$ and $83\frac{1}{2}$. South Metropolitan was quiet at from $119\frac{1}{2}$ to $120\frac{1}{2}$; and the debenture made $82\frac{1}{2}$. Commercials were not touched. Among the Suburban and Provincial group, Brighton original was done at 220 (a rise of 7), ditto ordinary at 155 (a rise of $3\frac{1}{2}$), South Suburban at $119\frac{1}{4}$, and Tottenham "B" at $112\frac{1}{2}$. In the Continental companies, Imperial marked $175\frac{1}{2}$ free and $176\frac{1}{2}$, Union preference 138, and European 25. Among the undertakings of the remoter world, Bombay changed hands at $5\frac{7}{8}$, Buenos Ayres at $14\frac{5}{16}$, Primitiva at $7\frac{1}{4}$, ditto preference at $5\frac{3}{32}$, ditto debenture at 98, River Plate at 17 and $17\frac{1}{8}$, ditto debenture at $100\frac{1}{4}$, San Paulo at $14\frac{1}{2}$, and ditto preference at $11\frac{7}{8}$ and 12.

ELECTRICITY SUPPLY MEMORANDA.

The Tragic Fire in South London—Small Causes and Big Results—Light Reading in the "Daily Mirror"—Electricity Running to Waste—Incompetence in Administration at Reigate.

IT is rarely the great festive season of the year passes without some appalling catastrophe that directs our minds to the very antithesis of our cherished ideals of Christmastide. The tale that was unfolded in the newspapers during the past week of the tragic fire at Messrs. Arding and Hobbs' shop, at Clapham Junction—a fire in which several lives were lost, terrible injuries received, property destroyed to an extent estimated at hundreds of thousands of pounds, and through which the deepest misery was scattered in many homes—could not fail to cast a shadow over all who are not devoid of ordinary human emotions. The cause of the fire is the matter in which we are concerned in these columns. The first evidence of eye-witnesses and shop assistants points as the cause to the accidental breaking of an electric lamp, and the fusing of a wire, in the neighbourhood, in a window, of the most inflammable of materials, such as celluloid combs and the flimsy decorations adopted by shopkeepers in dressing their windows at this season. The danger of such materials being placed in proximity to electric lamps has been demonstrated time and again. In spite of this, the electricians are not altogether free from blame for these disasters. Instead of cautioning shopkeepers of the peril, they advertise the absolute safety of electricity as a means of lighting, while they above all people are fully cognizant of the contrary being the case.

As to the South London holocaust, the day following care was taken by an electrician, through a representative of a morning contemporary, to make public the fact that high-pressure gas lighting was also used on Messrs. Arding and Hobbs' premises. But this does not in the slightest degree affect the amply confirmed testimony that the seat of the fire was a window that was only electrically lighted. Moreover, according to one account, in order to make the windows look as brilliant as possible during the Christmas show, a number of extra electric lamps were installed. At the same time, while all present available evidence suggests that electricity really originated the fearful catastrophe, the great

extent of the loss of life and of property must be largely attributed to the exceedingly combustible nature of the goods with which the premises were abundantly stocked. A more pronounced statement as to the cause of the catastrophe must be left until after the inquest, at which we are pleased to see the Battersea Electricity Department, the South Metropolitan Gas Company, the London County Council, and other bodies are being represented, in order, if possible, to elicit the true facts. Two days after the South London fire came the news of the total destruction by fire of the Kyles of Bute Hydro, near Rothesay; and here the origin of the fire is attributed to the fusing of an electric wire in a dark room adjoining the recreation room. The damage caused by the fire is estimated at £30,000. The magnificent pavilion on the Britannia Pier at Great Yarmouth has been reduced to ruin by fire, and the pier itself considerably injured. The damage is estimated at £15,000 to £20,000. The "East Anglian Times" ends up its account of the disaster by saying: "It was thought that the fusing of an electric lighting wire caused the fire; but this theory is considerably discounted now [by whom?], and the origin is at present untraced." It has also since been asserted that the electric supply was not connected up to the pier at the time. However, the first two events are laid (without much opening left for opposition on the ground of want of propriety) at the door of the much-advertised safest illuminant!

The halfpenny morning papers are at times responsible for circulating some striking examples of balderdash. The "Daily Mirror" last week gave its readers something to think about regarding electricity; and more foolish writing—writing that must have excited considerable merriment in many a central generating station as elsewhere—rarely has been seen, though on a subject that appears to present infinite opportunity for wild and freakish statements. Through the metallic filament lamps, electricity companies, we are told in this organ of veracity, are finding themselves with a tremendous quantity of current running to sheer waste; and those in charge of electricity stations are in the position of producing very nearly twice as much current as is being used. If this were true, the nearest lunatic asylum to the generating stations would be the proper place for those in charge of the latter. The "Daily Mirror" representative had been talking to an "experienced" electrical engineer. That experienced person, assuming the newspaper representative fairly mirrored what he said, if he has any employment (and there is a great want of lucrative positions just now in the electrical industry), ought to lose it quickly, both in the interests of his employers and the electrical industry. This electrical engineer is reported to have said: "The situation at present is that the companies are turning out current that they cannot sell." That is a categorical statement; but we have not noticed that any electrical engineer has written to contradict this libel on their competence to confine production to demand. But it is held to be in consequence of this fictitious condition, that strenuous efforts are being made to secure new customers for cooking, heating, and labour-saving appliances. In this connection, there is the loose and extraordinary statement that "a cistern large enough to give two ordinary baths full can be kept boiling by means of electricity at a cost of 25s. a quarter. If the "Therol" water-heater is referred to here, the statement is untrue. There is something for which to be thankful. "This glut of current is splendid for the public." Through it there is the prospect of brighter streets, and greater illumination in shops, at a cost almost next to nothing—that is to say, on a reduction of business the electricity stations can supply at a lower price. But the glorious benefits do not end at brighter streets and shops. There is introduced the pretty little piece of fiction that the new type of lamp effects a saving in cost of from 50 to 70 per cent., which, it is said, will enable the smallest of houses to be lighted electrically for a very modest sum. "A workman could run five lights in his house for something like £2 a year," said the electrical engineer to the willing recipient of his twaddle. What would those five lights be like in respect of illuminating power, how many of them could the householder use at one time, and what would be the number of hours of their running at £2 per year?

In a second article, in the "Mirror," there was a "fairy tale" by an electrical expert which the gullible newspaper representative took in as gospel. This "expert" went in for domestic electrification on the large scale; and he, as a result, declares that he managed to cut down his household expenses by some hundreds of pounds a year. Lucky electrical expert! How he is to be envied! There are not many professional electricals who have some hundreds a year to spend on their household expenses. But wealthy as he is, and despite the great saving, he had a complaint to make, and that was that he had to have duplicate wiring in his house before he could get heating and cooking by electricity at 1½d. per unit; and this second wiring meant an initial expenditure of about £100—that was for one house. Naturally (though the £100 was compensated over and over again in the "some hundreds" saved the first year) he thinks that one wire should suffice for the whole of the electrical service, and that the electricity supply company should make an estimate on the average of the past few years—we suppose a benevolent one on the side of the consumer—as to the lighting units to be charged at the higher rates, deducting them from the units to be charged at the lower rate for other purposes. There is, experience shows, too much speculation about that kind of thing. Points of lighting and hours of use of lighting have a way of increasing; and the average of the lighting units based on the past would soon be exceeded, and running well into the cooking and heating priced units if there were no check upon the consumer. Consciences do not suffer from any particular tension in such cases. This electrical expert excelled himself in his parting statement to the "Mirror" representative. "If," he remarked, "the companies would merely say 'We will light, heat, and cook from your existing circuit,' they would materially increase their revenue, as householders would be only too glad to abolish the use of coal and gas, and obviate the necessity of a larger staff of servants." Why couple-up gas with coal in this foolish manner? The popularity of gas for heating and cooking is largely due to precisely the same causes as are put forward for electricity, convenience and labour-saving, with the three others—and not unimportant ones—that gas is more economical, more efficient, and does not fail at the most inopportune time.

The Reigate Corporation are in a pretty mess over their electricity supply business; and they show a particular facility for going from muddle to muddle, each fresh one being of greater magnitude than the predecessor. The undertaking is one of those in which the late Mr. F. Hastings Medhurst was concerned, and on which the Corporation entered lightheartedly, and have ever since—over some eight-and-a-half years—been taking in aid of the undertaking an average of £1476 a year from the ratepayers, together with some respectable payments for public lighting. Without taking account of any excess payment for public electric lighting over gas lighting on modern lines, the amount lifted direct from the pockets of the ratepayers is nearly equal to an additional 2d. in the pound on the rates. In the period named, the cost of generation and distribution has amounted to £25,161; while the income has reached £32,848—leaving a gross income of £7687. Interest and repayment have absorbed £20,237; leaving a net loss of £12,550. Some special articles on the subject have appeared in the "Reigate and Redhill Chronicle," which articles place clearly before the ratepayers the financial condition of the municipal speculation. The writer seems to think that the dismal results have been brought about by, on the part of the Corporation, "a glaring weakness, want of ordinary business capacity, and a proper grasp of the responsibilities." We are not acquainted with the members of the Reigate Corporation; but, if we take a wider survey of the municipal electrical position, we find much the same condition of affairs electrical in other places, and we do not think that the want of financial success is due in all these various cases to the wholesale poverty of ordinary business aptitude and acumen that is attributed to the governors of the district of Reigate.

It appears to us that upon municipal trading being entered into, and financial failure being the result, that a species of demoralization supervenes, which causes town councillors to endeavour to conceal the dismal facts, and try all sorts of expedients to get themselves, without too much publicity, out of the disagreeable meshes in which they have got entangled; and should anyone dare to impugn their acts and knowledge, they simulate a great personal injury. Therein are the real seats of trouble; and things in consequence go from bad to worse, until there is an exposure like that there has been at Reigate. Disclosure was made at a Local Government Board inquiry, as to overspendings of capital, of the succession of losses, of prices for both private and public lighting being on no definite or sufficient basis. Stay, if we say all that was revealed at the inquiry, the palliating argument just advanced will be partially spoilt. The Local Government Board would not listen to any more loans being granted (except the sum needed to discharge overspendings) until an expert had been engaged to look into the financial difficulties of the concern. The Corporation held back in the matter of appointing an expert; they pleaded with the Local Government Board; and they alleged that they knew as much about the matter as any electrical expert could tell them—in fact, investigation by an expert was the very last thing the Corporation desired. What did they fear? An expert, it is understood, has, after months of procrastination, been appointed. Meantime the Corporation have resolved upon taking steps, in their own way, for patching up the fortunes of the concern—by raising prices, disallowing discounts, and by charging meter-rents. Six months' working under this order of things, has resulted in the income being less by nearly £130 than it was in the corresponding half year ending September, 1908; and what is more, the question of the legality of the meter-rents has been raised, and Counsel has given an opinion that what the Corporation have done in this regard is *ultra vires*. What they are going to do in the matter remains to be disclosed; the old policy of reserve having been adopted. But altogether the Corporation are in a pretty fix. What a difference from the roseate hue of the picture drawn eight-and-a-half years ago!

Obituary.

The death took place yesterday week, at the age of 83 years, of Mr. HENRY GIBBINGS, formerly proprietor of the gas-works at North Tawton, Devonshire. Mr. Gibbings carried on business in the town as a draper and outfitter, and was one of the promoters of a scheme for the introduction of gas lighting. He was one of the Directors of a Company formed for the purpose, and ultimately bought the undertaking from the Company. In his hands, the business developed considerably; but owing to advancing years, he recently sold it to the Devon Gas Association.

LUNGE'S "COAL TAR AND AMMONIA."

SECOND ARTICLE—AMMONIA.

THE portion of the fourth English edition of Professor Lunge's standard work on coal tar and ammonia which deals with tar was reviewed at length in the "JOURNAL" last week (p. 807). The remaining portion, referring to ammonia, occupies less than one-third of the whole work, and rather more than half of its second volume. Except for the sake of symmetry, it probably would have been better from the standpoint of users of the book to have published the whole of the matter relating to tar in one volume (which, though bulky, would have been less so than the single-volume previous edition of the whole work), and the portion of the present edition which refers to ammonia as a comparatively small but handy separate treatise. In most instances, the tar and ammonia industries are under different works management, and those technical men who constantly wish to consult a standard text-book on ammonia rarely require to have in their hands at the same time a lengthy treatise on tar and its products. Now that the enlargement of the original work has rendered it necessary to split the present issue into two volumes, a good opportunity has, we think, been missed by the publishers of dividing it in a rational manner according to the two principal subjects with which it deals.

The first chapter relating to ammonia describes the sources from which ammonia is obtained, and there are about thirty pages devoted to the formation of ammonia from the nitrogen of the atmosphere. In considering these processes, the author follows the late Dr. Ludwig Mond in dividing them into three classes—viz.: (1) Processes which aim at the combination of nascent hydrogen with nitrogen at high temperatures, or with the assistance of electricity, or in the presence of acid gases; (2) processes in which primarily nitrides are formed which are afterwards transformed into ammonia; (3) processes in which primarily cyanides are formed. With the first and second classes of processes, no great measure of technical success has yet been secured. The third class, however, includes the cyanamide or lime-nitrogen process of Frank and Caro, which was described by Dr. Frank in his paper before the London Section of the Society of Chemical Industry in 1908 (see "JOURNAL," Vol. CIV., p. 414). This and some other processes of the same class have attained, or are about to attain, great commercial importance; and some of the statements in earlier pages of Professor Lunge's book which speak disparagingly of the success of attempts to fix the nitrogen of the atmosphere (and which have been reproduced from earlier editions of his book), certainly need revision in the light of the modern developments of these processes that he duly records.

Sundry minor sources of ammonia are next referred to—including its derivation from sewage, from animal substances, and from vinasse or molasses residues. Then comes the more important subject of the production of ammonia from peat, which is effected practically by charging Mond producers with peat from which only a small proportion of its natural moisture has been removed. Readers of the "JOURNAL" will remember that the promoters of the Central Ireland Electric Power scheme intended to utilize this process for the recovery of ammonia from Bog of Allen peat used in Mond producers for the generation of gas at a central electricity supply works (see "JOURNAL," Vol. CIII., pp. 179, 772). After a short reference to the recovery of ammonia from shale as carried on in the Scotch oil-works, the author proceeds to deal with the production of ammonia from coal.

The first sub-division of this section relates to the production of ammonia in the manufacture of coal gas. The results of this production are summarized by the statement that "good gas coal should yield from 0·16 (as a minimum) to 0·25 parts of ammonia to 100 coal; 0·20 being a good average. But many (especially small) works get only 0·10 to, at most, 0·15 per cent. of ammonia." This generalization is, we think, based mainly on the working of Continental gas-works, which carbonize German coals, rather than on the results obtained in gas-works where English coal is carbonized. The present edition of the work includes a description of Feld's processes for the extraction of ammonia from gas and also an illustration of his washer. The second sub-division of the section dealing with the production of ammonia from coal refers to the treatment of coal or shale with steam as carried out in various producer processes, and in particular in the Mond process. We fancy the quotations by the author from various reports on the extent of the use of this process refer to all gas producers of the Mond type, though many such producers are not equipped with ammonia-recovery plant. It is only when an installation of Mond plant is of considerable size that it pays to recover the ammonia from the gas. Indeed, Professor Lunge speaks dubiously of the economical success of attempts to introduce ammonia-recovery in plant consuming less than 50 tons of coal per day. The third sub-division of this section deals with the recovery of ammonia from coke-oven gases, which has increased to a considerable extent in recent years in this country, and still more so in Germany. The fourth sub-division relates to ammonia from blast-furnace gases, which is recovered only in certain districts in Staffordshire and in Scotland, where splint coal is used in place of coke in the blast furnaces. The fifth sub-division—viz., on ammonia from producer gas—is of little importance apart from the Mond process, where the recovery of ammonia is, the author says, purposely made a principal feature. This process was fully dealt with by him under the second sub-division, as already mentioned. The sixth and last sub-division refers to the at present somewhat academical problem of the recovery of ammonia from coal smoke.

The second chapter of the portion of the work referring to ammonia deals with the composition and analysis of ammoniacal liquor and the properties of its constituents. A good deal of new matter has been introduced into this chapter, mainly from the reports of the Alkali Inspectors, since the publication of the last edition. The author's exposition of the "ounce" valuation of the strength of ammoniacal liquor is deficient in clearness; and as the practice of stating the strength of liquor in "ounces" is likely to continue for many years to come, it is a pity he has not explained its basis more fully and clearly. The fact that it is not followed in Germany is not sufficient reason to justify an inadequate recognition in a text-book for English readers of its use and meaning in this country. This chapter contains all the necessary information in regard to the properties of ammonia and its technically important salts.

The next chapter has reference to the working up of ammoniacal liquor. A couple of pages of new matter have been introduced, on the removal of the cyanides from gas liquor before distillation; and, incidentally, reference is made to the use of ferrous sulphate for the extraction of the cyanides from crude coal gas. The inference which the uninformed reader would draw from these pages is that methods of cyanogen recovery which have been in use on certain English gas-works for many years are of quite recent origin. It is stated that the average quantity of sodium ferrocyanide obtainable per ton of coal carbonized amounts in coke ovens to about 1·1 lbs., and in gas-works to about 1·6 lbs. Descriptions of some more modern types of plant for the manufacture of concentrated ammoniacal liquor, liquor ammoniæ, and anhydrous liquid ammonia are given, in addition to, or in place of, the descriptions of older plant which appeared in earlier editions. In regard to plant for the manufacture of sulphate, there is not much new matter of importance, though a summary is given of most recent patents relating to such plant. In the section dealing with the prevention of nuisance from ammonia works, attention is rightly called to Skirrow's observations on the large quantity of phenols which are ordinarily lost in the spent liquors from these works. He estimates that 0·37 to 0·55 lb. of phenols is lost in these liquors per ton of coal carbonized, as against 0·53 lb. of phenols recovered from the tar. Thus nearly half the phenols produced in the retorts is lost in the spent liquor. The problem of how to deal with the sulphuretted hydrogen evolved in the working up of gas liquor is fully treated, and references are included to recent reports of the Alkali Inspectors in which the question is referred to. The chapter ends with some statistics as to the production of ammonium sulphate in this country and abroad—for the most part commendably up-to-date.

The last chapter of the work relates to technically important ammonium salts other than sulphate. These are described, and the processes for their production referred to in sufficient, though not great, detail. At the conclusion is an appendix of tables for the reduction of specific gravities to standard temperature, and for comparing the degrees of different hydrometers, and of the Centigrade and Fahrenheit thermometers.

The portion of Professor Lunge's treatise which relates to ammonia is, as a whole, very satisfactorily carried out, and the references to all important recent modifications of processes have been included in the present edition. There are many misprints and faulty expressions throughout the two volumes; but they are perhaps rather more conspicuous in the portion which relates to ammonia than in that which has reference to tar. Considering that Professor Lunge has not been resident in this country for many years, it would be ungracious to lay stress on his occasional lapses into German styles of expression and composition, though we think some of those which occur should not have been passed by the publishers' reader.

A pleasing incident occurred at the Bedford Gas-Works on Wednesday last, when a very enjoyable evening was spent; the occasion being the celebration of the silver wedding of Mr. and Mrs. Dann. The staff and employees, to the number of upwards of a hundred, assembled at a repast; and a well-selected programme of music (made up entirely by members of the Company's staff and employees) was gone through. In an interval, a presentation was made by the Secretary (Mr. S. W. Adams) on behalf of the staff, and by the works foreman (Mr. Joseph Taylor) on behalf of the employees. The gift from the staff consisted of silver pepperettes, salts and mustard, and a handsome silver tray, suitably inscribed, and a pipe from the men for Mr. Dann, and an ebony silver-mounted toilet set, with initials, for Mrs. Dann.

It has already been announced in the "JOURNAL" that Professor Harold B. Dixon, M.A., F.R.S., will give two lectures to juveniles, at the Royal Society of Arts, on "The Chemistry of Flame." The first will be delivered on the 5th prox., when Professor Dixon will tell his audience what were the old ideas about flame, and explain how chemists found out that air was necessary for fire, and that one portion of the air was used up in burning. He will then describe the properties of oxygen and the burning of hydrogen and carbon, and show how flame gives light. In his second lecture, on the 12th prox., he will demonstrate what happens when air is mixed with gas that is burning, and will explain Davy's experiments on flame, and the passage of flame through an explosive mixture of gases; closing with some remarks on the incandescent gas-burner.

IMPROVEMENTS AT THE ILKLEY GAS-WORKS.

THERE has lately been carried out at the gas-works of the Ilkley Urban District Council an interesting scheme of improvement which was formally inaugurated on the 24th ult., when the whole of the new plant—comprising retort work, coal and coke handling machinery, mechanical stoker, &c.—was seen in operation. It enables coal to be taken from the yard and carbonized, and coke deposited in the yard, without manual labour.

On entering the gas-works, a large dormer jutting out of the retort-house roof, with an elevator, immediately attracts attention. It is shown in fig. 1. The coal is brought to the works by carts and tipped into a receiving hopper of 25 cwt. capacity, the top of which is level with the ground. This hopper has an outlet and reciprocating tray feed, delivering coal automatically into a breaker, the supply to which can be regulated from the yard level by means of the hand-wheel seen in the illustration operating the slide door of the coal-hopper, and also by adjusting the stroke of the tray feed. The breaker is of the two-roll type; the rolls and gearing being of cast steel. The claws are fixed on square shafts turned down at the ends; and the shafts revolve in brass-bushed bearings formed in the cast-iron frame of the breaker.

The coal passes through the breaker into the boot of the elevator, and is picked up by the buckets and deposited in the storage hoppers. The elevator is about 53 feet centres, and is fitted with a chain made up of cast-steel and mild-steel links alternately, to which cast malleable buckets, 12 inches wide, and skidder bars are attached at 2-inch pitch. The elevator, breaker, &c., will easily deal with 15 tons of coal per hour. The shoot at the elevator head is made of the swivel type, in order to fill as completely as possible the large storage hopper, which is 24 ft. by 18 ft., and 13 ft. 6 in. deep, with a capacity of approximately 100 tons.

Though the roof principals were at a low level, Mr. Everitt, the Gas Engineer and Manager to the District Council, decided that they should remain as they were, and that the hopper should be built around them; care being taken to protect the principals from coming within the hopper. As the illustration clearly

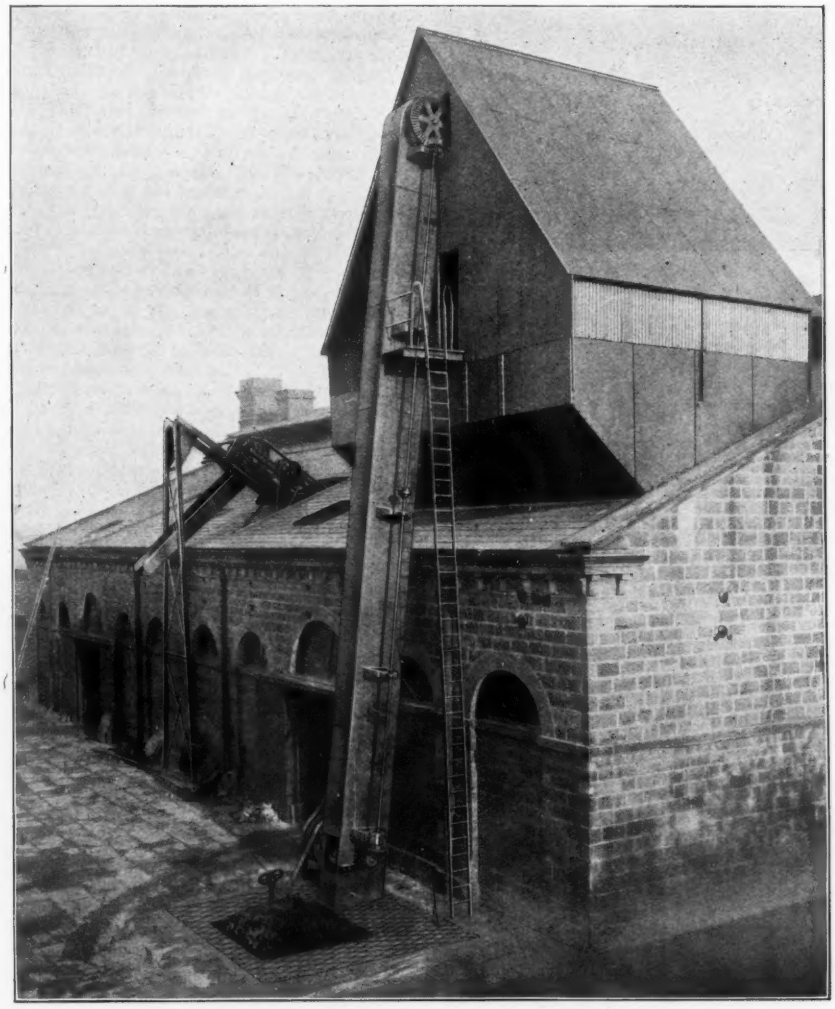

Fig. 1.—Coal Elevator, &c., at the Ilkley Gas-Works.

shows, the hopper is covered with corrugated sheeting, and is provided along the top with a platform, which is reached from the ground by a ladder placed near the elevator. The bottom of the large hopper is fitted with four sets of double slide doors, with the usual levers, &c., for operating them; and the coal is delivered from it into the hopper fixed on a De Brouwer combined stoking-machine. This is electrically driven, and travels up and down the house on rails laid in the floor; collecting current from bare trolley wires suspended overhead. For the various operations of charging, pushing, traversing, and hoisting, the machine is equipped with three motors, having suitable controllers, within arm's length of the stoker on the machine platform.

Two beds of nine retorts, each 21 feet long, have been erected, forming the first section of the new carbonizing plant. The two new arches are built with regenerators on Brooke's patent system, a noteworthy point of which is the ease with which the heat is regulated and distributed throughout the setting. The bench bracing, mountings, &c., are new; but the old hydraulic and foul mains have been brought into service again.

With regard to the coke-handling plant, Mr. Everitt appears to have solved this problem by designing a reversible conveyor in the floor, in front of the bench, and an inclined cross conveyor, as shown in fig. 2, at the centre of the house, which delivers coke into the yard. The conveyors are of the type of Messrs. Robert Dempster and Sons, Limited, a special feature of which is that the chain is carried outside the trough, thereby avoiding the wear and tear due to the contact with the coke and water. The conveyor in front of the bench is formed of 7 in. by 3 in. angles and ¼-inch bottom plate; a cast-iron renewable plate being placed in the trough. The chain is of parallel type, and travels on rollers fixed to the angles of the trough. At 3 feet pitch, the chain is provided with special attachment links to which are fixed cast-steel rakes. The contractors claim that these rakes are preferable to ordinary push-plates or drag-bars, as they do not bind the coke on to the bottom of the trough. The return of the conveyor is carried overhead on brackets suspended from the buckstays, and again the chain is carried on the rollers. It will therefore be seen that there is no scraping whatever on this conveyor.

The driving gear, which is made for reversing with open and crossed belts, is fitted at one end of the house, and the usual tension gear at the other. The inclined or cross conveyor is of the same type as the one just mentioned (see fig. 2); the only difference being that the return angle supports are braced to the trough to form a lattice girder which spans the house. The conveyor at present delivers the coke into the yard; but it is so arranged that a small screening plant could be added at any time,

Fig. 2.—Coke Conveyors inside the Retort-House at Ilkley.

if found necessary. As will be seen from fig. 3, Toogood's patent equalizing gear has been utilized, to avoid shocks and to maintain a consistent pull on the chain.

Provision has been made in the corner of the retort-house for a small engine-house; and on entering this there is found a gas-engine and dynamo. The engine, which is of 33½ B.H.P., and of the "National" Company's make, drives the elevator, breaker, and conveyors direct by belts, gearing, and shafting, and also the dynamo by means of a belt. The Lancashire Dynamo and Motor Company, Limited, provided the dynamo, which is of a special type; being so arranged that it can run as a compound machine, and provide current at 120 volts for the stoking-machine, or it can be run as a shunt machine by cutting out the series windings, and generate current at 170 volts for charging accumulators—it being intended at some future date to put down a duplicate generator, and use it for providing current to light the public hall.

As far as can be seen, everything appears to be running easily and smoothly, and the plant generally reflects much credit on Mr. Everitt, who designed it, and on the Contractors—Messrs. Robert Dempster and Sons, Limited, of Elland, who constructed the settings complete with the coal and coke handling and electricity generating plants, and Messrs. W. J. Jenkins and Co., Limited, of Retford, who supplied the stoking-machine.

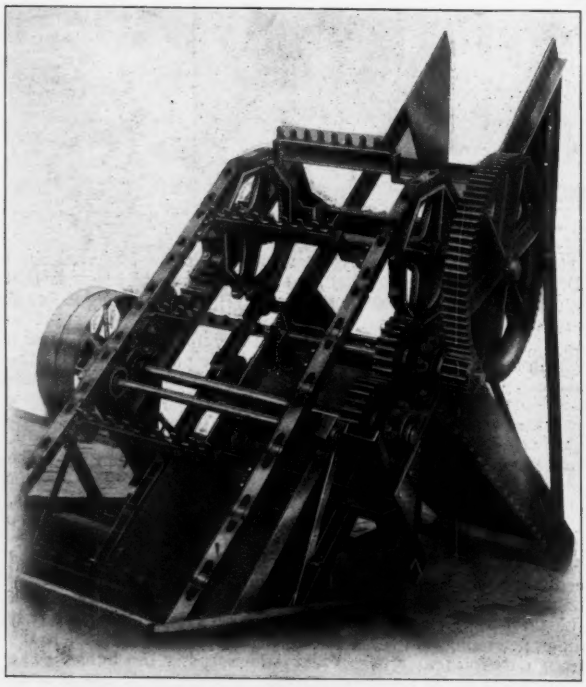

Fig. 3.—Head of the Coke Conveyor at the Ilkley Gas-Works.

STATISTICS OF DUTCH GAS-WORKS.

We have received, through the courtesy of Heer P. Bolsius, the Manager of the Bois-le-Duc ('s-Hertogenbosch) Gas-Works, a copy of the statistical returns of the working results of the municipal and some of the private gas-works of Holland for the year 1907. These returns have been compiled by Heer Bolsius in collaboration with Heer M. van der Horst, of the Amsterdam Gas-Works; and the information contained in the work is more or less of a confidential character—being intended primarily only for circulation among the members of the Dutch Association of Gas Managers. The present issue continues the series of annual returns which have been produced without interruption since 1899, when the late Heer D. van der Horst, then Manager of the Amsterdam gas undertaking, was responsible (in conjunction with Heer Bolsius) for their compilation.

The statistics furnished are of an exceptionally complete character, and to the best of our belief are more comprehensive than those contained in any publication relating to the gas-works of other countries. They refer to 121 cities and towns of Holland, which are arranged in order of population, starting with Amsterdam with its 565,662 inhabitants on Dec. 31, 1907, and finishing with Ravenstein, with only 894 inhabitants on the same date. In 1899, there were only 87 gas undertakings included in the returns, which were at that date of a somewhat less complete character. The names of the managers of the respective works are now given, and the date when the works started operations. There are shown to have been a good many transferences of ownership of works from private companies to the municipalities in comparatively recent years; and at least thirteen towns which now have gas-works appear to have erected them since the beginning of this century. Such growth in the number of towns using gas is an indication of the activity of the gas industry in Holland.

The amount of coal carbonized by each works is stated, and in most cases the amounts of English and German coals used are given separately. The totals for all the works are not indicated; but it would appear at a rough estimate that over 40 per cent. of the coal carbonized in all the works is of English origin. The make of gas per 100 kilos of coal carbonized is stated, and the maximum and minimum make per month and per day. The number of settings and of retorts, and their types is stated for each works, and the largest and smallest numbers of retorts in use at any time in the course of the year. The average charge per retort per diem is also given. Then follow particulars of the water-gas plant and production at those works which have such plant. Eighteen gas undertakings produced water gas during 1907—the Humphreys and Glasgow type of plant predominating, though four other types are represented at various gas-works. For the most part the water gas is carburetted with petroleum oil of the Solar grade, though some works carburet with petroleum spirit or benzol. The consumption of coke and of oil per cubic metre of gas made is given in most cases; but having regard to the confidential character of the statistics, we do not feel at liberty to reproduce these figures. The illuminating power and the calorific value of the water gas and of the mixed gas also appear in many instances, as well as the percentage of carbonic acid in the water gas. This percentage ranges from 2·9 to 5 per cent.

Then follow for each town particulars of the quantity of gas consumed for public lighting, by private consumers (the figures for the last-named being divided to show separately the consumption through ordinary and through prepayment meters), on the works, and the unaccounted-for gas. The latter seems to vary from a minimum (for the larger works) of 1·16 per cent. at Tilburg to a maximum of 6·85 per cent. at Nijmegen. The production of coke and its disposal are next dealt with, followed by similar particulars in regard to tar and ammoniacal liquor. Full details are given as to the number of lamps and the consumption of gas for street lighting, and the number of consumers' meters, and their description, in use.

The prices charged for gas for lighting, heating, and power purposes to ordinary consumers, and for that supplied through prepayment meters and for public lighting are stated separately. Speaking broadly, the larger towns appear to charge the same price to private consumers whether the gas is used for lighting or for other purposes. In this respect, the larger Dutch gas-works seem therefore to follow English, rather than German, procedure. The length and size of the mains of the distributing system, and the average pressure of the supply are stated. The position of the purifiers and the amount of gas purified per ton of oxide used are also given. Then follow particulars of the tests made for illuminating power and calorific value; the details being given in most cases as to the description of photometer, standard of light, and standard burner used in the tests. The "Metropolitan" argand burner No. 2 and the Harcourt 10-candle lamp are now in use in the official testings for several important works, though the "London" argand No. 1 was retained for many others at the close of 1907. The statistics conclude with particulars of the fire insurances on the works.

The compilers have carried through their self-imposed task with the greatest assiduity, and have presented their colleagues with a most valuable review of the working results of the gas-works of Holland. We understand that the similar statistics in regard to the year 1908 will shortly be issued by them.

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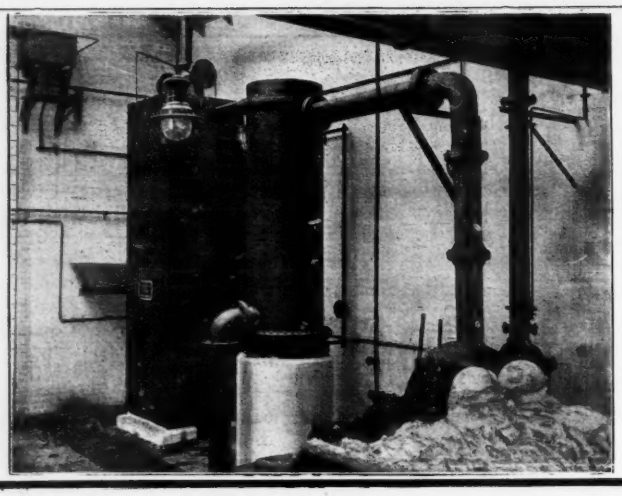

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WATER AFFAIRS.

Review of the Principal Events of the Year.

THE close of another year affords an opportunity of reviewing the principal events in connection with the supply of water which have been recorded in our columns. Though they have been of a less conspicuous character than those which have called for notice at previous similar periods, they are nevertheless of sufficient importance to justify attention being again directed to them.

THE WEATHER.

As there is intimate connection between meteorological conditions and water supply, a few remarks in regard to the weather will not be inappropriate as a commencement to our retrospect. The year 1908 was one of the brightest within memory. The record of the twelve months shows that in all but one there was more than the average amount of sunshine; that, generally, there was a deficiency of rain; and that the temperature, while a little below the normal during the spring and summer, was much warmer than usual in the autumn and winter. There were two heavy snowfalls—the first in April and the second in December. The latter began on the 27th of the month, and continued for three days—culminating on the 29th. It brought the coldest days of the year, and, in many parts of the country, the lowest maximum temperature ever officially recorded. On the 30th of December the maximum shade temperature was 25°, and the minimum 18°. A rapid thaw set in early next day; and for several hours the condition of London streets was almost indescribable. The combined efforts of armies of workmen and a fairly heavy rainfall soon cleared the thoroughfares. During the prevalence of the frost, a water-main burst in Fenchurch Street and rendered useless a number of hydraulic lifts; but a more serious matter was the annual recurrence of the blocking of the leat at Devonport. In 1908 the Corporation had pipes laid to take the place of a portion of the leat. But there was left a length of seventeen miles of open watercourse; and where this was most exposed, snow accumulated to such an extent as practically to stop the flow of water. The work of clearing the leat proved very difficult; but fortunately a thaw came to the assistance of the gangs of men in restoring the service. As in the preceding year, the short spell of frost was severely felt in Liverpool; and when the thaw set in, more than 4000 leakages, mostly from private lead pipes, were reported at the water office or discovered by the inspectors. The extent of the loss of water will be appreciated from the fact that before the thaw the daily consumption was about 28 million gallons, whereas afterwards it rose to upwards of 46 millions. These were the weather conditions which ushered in the year 1909, the characteristic features of which have been a great quantity of rain, and, with the exception of a short spell of intensely hot weather in August, generally a temperature below the normal. Notwithstanding the rain, however, shortage of water was experienced in several parts of the country, especially in the west. In the middle of October, several of the towns in Cornwall were threatened with something like a water famine. The Camborne and Truro Water Companies and the Redruth District Council were greatly inconvenienced; and Penzance and other towns in West Cornwall felt the effects of the drought.

METROPOLITAN WATER BOARD—WORK AND FINANCIAL POSITION.

As in previous years, we will commence our retrospect with the Metropolis, and glance at the year's work of the Water Board. At the first meeting after the Christmas recess, the members were informed by the Finance Committee that the District Auditor (Mr. A. Carson Roberts) had disallowed an item of £59 16s. 4d., the costs incurred in connection with the ceremony on the occasion of the opening of the Walton reservoirs, and had surcharged the amount upon the members of the Committee who had signed the order for payment. Various courses were proposed with regard to the surcharge; but eventually the matter was referred to the Law and Parliamentary Committee. At the same meeting, sanction was given to the expenditure of another £37,850 on the Honor Oak covered service reservoir, which would make a total of £198,000; and it was stated that it would be the cheapest reservoir ever built. Undaunted by the action of the District Auditor, the Board decided at their next meeting to spend not exceeding £150 in connection with the ceremonial opening of this reservoir, which would take place in May. Before the Board rose for the Whitsuntide recess, they adopted an exhaustive scheme of superannuation (the fund to be contributed to by the officers and the Board), and also decided to establish a pension fund. They likewise had under consideration the question of paying the Chairman, which they have power to do under the Metropolis Water Act, 1902. The matter arose in connection with defraying the expenses attending the "official hospitality" of the Board, which it was thought should not fall upon the Chairman personally. The General Purposes Committee recommended that the salary should be £500 per annum, to commence from the 1st of April this year; and the proposition was agreed to with two dissentients. As, however, only 21 members voted out of the 66 composing the Board, it was thought by some that the vote did not fairly represent the general opinion. An attempt was made to set aside the decision; but without success. It should be recorded that the Chairman (Mr. E. B. Barnard, M.P.) was in no way concerned in bringing forward the proposal.

On the re-assembling of the Board after the recess, Lord Welby, the Chairman of the Finance Committee, submitted the estimates for the year 1909-10. Dealing first with the accounts for 1908-9, he said the income was estimated at £2,852,000 and the expenditure at £2,930,000; showing a probable deficit of about £78,000. The actual result, however, had been much more favourable; for the income was £25,000 above and the expenditure £25,000 below the estimates—leaving a deficiency of £28,000. [On the publication of the accounts later in the year, this figure was reduced to £25,000.] With regard to the year 1909-10, Lord Welby estimated the expenditure at £2,951,000, and the revenue at £2,888,000; leaving an estimated deficit of £63,000. But he made the encouraging remark that if unforeseen contingencies did not arise, and if the Committees continued their careful control over the expenditure as it proceeded, the result would be a smaller deficit than that which appeared on the face of the estimates. At the same time, he expressed the fear that the period of surpluses had passed away, and that henceforth the Board would have to impose upon the rates every year a greater or less charge. This prospect, he said, enjoined a firm control over, and a careful administration of, their finances; for they must expect that the ratepayers, when the Board sent in their bills, would demand proof that their deficits were unavoidable. His Lordship's forecast turned out correct; for, in a letter written to the "Financial News" which was reproduced in our columns a few weeks ago, the Chairman of a Ratepayers' Association called for a searching inquiry into the financial position and management of the Board, in order to ascertain the reason of their being unable to show the profits made by their predecessors, the much-abused Water Companies. And yet, in face of prospective deficits, with their "B" stock falling in market value (it was 92¼ at the beginning of the year and it is 88⅝ now), and prevailing general dissatisfaction on the part of occupiers of non-residential premises at the greatly increased charges imposed under the Act of 1907, the Board have been talking of spending £200,000 on the erection of new offices in Kingsway, while they have an unoccupied site of upwards of 7 acres in extent in Rosebery Avenue. The proposal was, however, at the last meeting before the Christmas recess, referred back, for further consideration, to the Committee who brought it forward. As bearing upon the financial position of the Board, it will be appropriate to record here the announcement by Lord Welby of his retirement, and the recognition of his valuable services as Chairman of the Finance Committee, which he had held since the inception of the Board.

Reverting to the general work of the Board, as the arrangements for conducting the business had all been pretty well settled, it was considered unnecessary for the members to be called together every fortnight. Accordingly, it was resolved early in July, by a considerable majority, to meet monthly in future; and a fortnight later the Board rose for the summer recess. On re-assembling on the 8th of October, another attempt was made to rescind the resolution granting the Chairman a salary of £500 per annum; but it was again unsuccessful—the voting being two to one against it. At the next meeting, the members

had the gratification of learning that the Local Government Board had remitted the surcharge of £59 16s. 4d. by the District Auditor to which reference has already been made. As the amount in question was expended in refreshments incidental to the ceremonial opening of the reservoirs at Walton, it will be convenient to notice here a similar function in connection with the Honor Oak reservoir, which was brought into use on the 5th of May, the ceremony being performed by the Right Hon. the Lord Mayor (Sir George Wyatt Truscott) in the presence of a very large gathering of ladies and gentlemen. The reservoir is the largest of its kind in the world ever constructed at one time and under one contract; and it occupies an area, including the banks, 14¼ acres in extent. It was designed by, and constructed under the supervision of, Mr. J. W. Restler, M.Inst.C.E., the Chief Engineer of the Southwark and Vauxhall Water Company, who initiated the undertaking; and it was commenced by the Board, of which Mr. Restler is the Deputy Chief Engineer, after they had taken over the duties of the Company. It affords additional storage of some 60 million gallons, and raises the Board's total storage to 304 million gallons. It was named the "Beachcroft" reservoir, after the first Chairman of the Board, Sir Melvill Beachcroft, who is now the Chairman of the London County Council. During the year good progress has been made with the two reservoirs in course of construction by the Board at Chingford and at Island Barn, East Molesey. The former, which was commenced during the spring of last year, will have a capacity of 3000 million gallons; and the latter, which was started in the following October—earlier than was originally intended, with a view of giving work to the unemployed—will be just one-third the size. Both of them were designed by Mr. W. B. Bryan, M.Inst.C.E., the Chief Engineer of the Board.

The Board's Litigation.

It is hardly to be expected that an organization of the magnitude and character of the Metropolitan Water Board can be carried on without litigation; and therefore it is not surprising that our pages have contained during the year records of cases in which the Board has figured more or less conspicuously. At the Hilary sittings of the High Court of Justice, the question which had arisen in the summer of 1908 in regard to the payment of surveyor's fees in connection with the Honor Oak reservoir was before a Divisional Court composed of the Lord Chief Justice and Justices Bigham and Walton. The District Surveyor (Mr. Ellis Marsland) claimed fees amounting to £297 for surveying the reservoir as a covered structure under the London Building Act, 1894. The proceedings were taken against the Contractors for the work (Messrs. J. Moran and Son, Limited); and the result was a decision by the Magistrate at the Lambeth Police Court in favour of the claimant. The Contractors appealed, but without success. The same learned Judges had before them an appeal in respect of the rating of the Board's undertaking. After a long inquiry, the Court of Quarter Sessions for the County of London decided that the works in the various parishes should be rated as an undivided concern, and not separately as contended by the Assessment Committee; but they stated a case for the opinion of the High Court as to whether or not they were wrong in law as to the principle on which the rateable value of the property had been ascertained. The Court decided that they were not, and therefore they refused to send the case back for further calculations to be made. The London County Council were, of course, dissatisfied with the result; and at their meeting on the 30th of March they passed a resolution to the effect that the method of arriving at the rateable value of the Board's undertaking in the various parishes was inequitable to London, and gave instructions that it should be sent to the Board and to the London representatives upon it.

The question of the liability for water supplied to flats was before his Honour Judge Woodfall, at the Westminster County Court, in a test case. The defendant occupied a flat in Cranworth Gardens, Brixton, the water-rate for which had been paid by a house agent. He, however, discontinued doing this, and referred the Board to a firm acting as receivers of the property. As the Board's claim was not met, they proceeded against the user of the water, who denied liability on the ground that he had paid for it in his rent. The Board submitted that under their Charges Act of 1907 "farming" agreements could not be made; and, moreover, they had given notice that any in existence would be determined at a specified date. The tenant would have his remedy against the person he had paid. His Honour gave judgment for them, but granted a stay of execution in the hope that there would be an appeal. This hope was realized; the question coming before Justices Darling and Bucknill in the King's Bench Division a few weeks ago. It was urged that the notice given by the Board did not determine the agreement between them and the owner, but only intimated that the terms of supply would be revised. In the result, their Lordships decided that the judgment in the Court below was so unsatisfactory that there must be a new trial, to allow of all the points raised being properly dealt with. Another test case turning upon an agreement had reference to the supply of water for a fire hydrant at the King's Theatre, Hammersmith. The agreement was originally made with the West Middlesex Water Company, and it was submitted by the Board that though, under their Act of 1907, it was determined so far as regarded the "domestic" supply to the theatre, it remained in force in respect of the hydrant, the supply being from a high-pressure main. The County Court Judge held that the agreement was still in force, and he gave judgment for the Board, but granted a stay of execution. The case came before Justices Darling and Bucknill on appeal early in the Michaelmas sittings; and they came to the conclusion that the agreement was preserved by section 35 of the Act of 1907. They accordingly decided that there was good basis for the claim, and that the appeal must be dismissed, with costs. Leave to further appeal was, however, granted. A few weeks ago, the Board were the defendants in an action brought by the Conservators of the River Thames to obtain a declaration of the rights of the parties as to the quantity of water drawn by the Board from the river through the intakes of the old Southwark and Vauxhall Water Company. After being before Mr. Justice Phillimore for two days, the case was ordered to stand over in order that the pleadings might be amended. The last case to call for notice raised a question of much more importance than those just referred to. It was an action by the South Suburban Gas Company to determine whether the Board were entitled, under the Act of 1907, to charge them 5 per cent. on the rateable value of their property, as in the case of an ordinary domestic supply, for water used on their works, or whether the Company could demand a supply by meter, as for trade purposes. The case occupied Mr. Justice Neville for two days, and resulted in judgment in favour of the Board. It affected them more than the Company, inasmuch as the supply to the works had been cut off, by request, at Michaelmas, 1908. But if the point urged had been conceded, the decision would have applied to all business premises, and would thus have greatly affected the Board's revenue. His Lordship's judgment established the principle that it is the character of the user, not the nature of the premises supplied, which regulates the charge to be made for water.

Water Schemes Completed.

Turning from the Metropolis to the Provinces, it will be of interest to notice briefly the more important schemes of water supply to which reference has been made in the "Journal" during the year. Perhaps the first place should be given to the Jubilee of the Loch Katrine water scheme for the supply of Glasgow, which was opened by the late Queen on Oct. 14, 1859. At that time the population of the water supply district was 439,900, and the average daily supply from Loch Katrine 14,675,000 gallons; whereas last year the population was 1,117,229, and the quantity drawn from the lake 60,817,000 gallons. At present a scheme is being carried out to include the waters of Loch Arklet, for which the Corporation of Glasgow obtained parliamentary powers in 1885. The matter has been in abeyance pending the settlement of a claim by the Duke of Montrose for compensation for the land to be taken. It was put at £26,500; but he has been awarded £19,090 only. The level of the loch is to be raised 22 feet, and its area enlarged from 207 to 561 acres. The alteration will add 10 million gallons daily to the quantity of water available for the city, and bring it up to 75 million gallons. While dealing with the supply of water north of the Tweed, it will be convenient to record that the Corporation of Aberdeen decided in September to apply for parliamentary sanction to a scheme for taking a supply of water from the River Avon, in two instalments, each of 10 milllion gallons per day, at the cost respectively of £1,068,500 and £443,500—together, £1,512,000.

Crossing the Border, and coming South, we have to notice in the first place an event which practically marked the completion of the scheme for supplying water to Carlisle from the Geltsdale Valley, which has cost the city something like £288,000. The event referred to was the turning of the water into the great reservoir at Castlecarrock, which has a top-water area of 43 acres, a maximum water depth of 33 feet, and a capacity of 170 million gallons at the draw-off level. The scheme had been in progress for twelve years; and, as "JOURNAL" readers may remember, it had been the cause of much anxiety to all concerned with it. Its satisfactory completion was consequently a source of considerable gratification. A few weeks previously, the annual visit of the members and officials of the Hull Corporation to the water-works was taken advantage of to perform the opening ceremony in connection with a new reservoir which had just been completed at Keldgate, near Cottingham, at a cost of £43,000. It was designed by the former Water Engineer (Mr. F. J. Bancroft, now of New Barnet), and it has a top-water level 140 feet above Ordnance datum; its capacity being 10 million gallons. Early in the year, the announcement was made that the water-works undertaking at Cowpe, on which the Corporation of Bacup had spent considerably over £200,000, was practically complete; the reservoir having been filled to within a few inches of high-water mark. About the middle of July, a numerous company assembled at Clipstone, near Mansfield, to participate in the opening ceremony and inauguration of the new water-works constructed by the Corporation for the supply of the borough and the adjoining districts served by them under agreements. The works were designed to furnish 750,000 gallons a day; and it was estimated that their total cost, including land, would be less than £30,000. In carrying out the undertaking, the Corporation were advised by Messrs. Hodson, of Loughborough, their Consulting Engineers, who have also prepared a new water scheme for Wirksworth. As evidence of the extending use of ferro-concrete in connection with water-works, it may be mentioned that a covered reservoir for filtered water, having a capacity of 1½ million gallons, has been completed for the Corporation of Cowes.

During the year, schemes of water supply or extensions of works have been completed for Bury (the Scout Moor reservoir), Elloughton and Brough, Liss, Llandudno, Raunds, Penrith, Sheffield (Rivelin tunnel), Shrewsbury, Skipton, and Telscombe. Considerable extensions have been in progress in connection with the Camborne Water-Works; and a storage reservoir having a capacity of 4 million gallons has been almost completed. Early in the year, a commencement was made with a huge steel water-tank for the supply of Calcutta by gravitation. The special feature of the tank, which forms an important constituent of a scheme of improved water supply for the city, as devised by the Chief Engineer to the Municipality (Mr. W. B. MacCabe, M.Inst.C.E.), is that it will stand at an elevation of 90 feet above the ground level, and be supported on steel trestles. As this will be the largest steel water-tank in the world, it is pleasant to be able to record that the contract for its construction has been secured by Messrs. Clayton, Son, and Co., Limited, the well-known gasholder builders, of Leeds, at a price of £91,367. Towards the end of October, the Mayor of Lincoln (Mr. W. S. White) laid the first pipe of the rising main which is to convey the new water supply from Elkesley to the city—a scheme which will involve the outlay of £190,000.

NEW WORKS AND EXTENSIONS.

New works and extensions of those already existing have been proposed for Chesham, Chichester, Diss, Haydon Bridge (Hexham), High Wycombe, Hitchin, Instow, Lurgan (Ireland), Lymington, Paignton, Petersfield, Plymouth, Richmond (Surrey), Ryde, Saxmundham, Swansea, Warrington, and Yarmouth. Local Government Board inquiries have been held during the year with reference to the water supply of Ballymena, Bedale, Bolton, Brixham, Chesterfield, Dartmouth, Dover, Hope (Chapel-en-le-Frith), Kinver, Leyland, Lincoln, Londonderry, Northampton, Paignton, Preston, Ruddington, Saltash, South Moulton, Spalding, Twineham, and Wellington (Salop), as well as on the subject of the supplies in the Cornish villages and in the rural districts of Devonshire. A good deal of discussion has taken place during the year on the subject of increasing the water supply of Exmouth, more especially in connection with the boring now in progress at Dotton. The District Council's proposal to go to Parliament last year for additional powers was rejected; but they are making another attempt, and so far have been successful. While referring to borings, mention may be made of the increase in the number of artesian wells sunk during the year. From some of those within the City of London, made as the result of the high charges of the Metropolitan Water Board, from 6000 to 8000 gallons per hour are being pumped from depths ranging from 400 to 550 feet. One in Moorgate yields 2000 gallons per hour from a depth of 450 feet. A well at Slough was completed towards the end of September, after three years' boring; water being found in abundance at 1100 feet. This was an exceptionally interesting piece of work, inasmuch as it was the first successful tapping of a water supply from the lower greensand formation; at least four boreholes having previously been carried down to great depths in the London basin, but without result. In view of the success of the borings in the City, a Special Committee was appointed to inquire as to the powers of the Corporation in regard to supplying water by this means; but they reported that it was not expedient to take action, and the Corporation adopted their report.

WATER LEGISLATION.

It will be convenient to refer here to the new works, extensions of limits, and increases of capital which have recently been sanctioned by Parliament. It is unnecessary, however, to deal with them at any length, as the work of the unusually protracted session in connection with water supply has lately been reviewed. Taking Companies first, the Aldershot Gas, Water, and District Lighting Company obtained authority for the construction of a well, two pumping stations, and a covered service reservoir, and also for raising £200,000 of additional "C" stock. The Bungay, Clevedon, and Donnington Water Companies were granted powers of incorporation; and the Frimley and Farnborough Company were permitted to extend their limits of supply, use certain lands for the purposes of their undertaking, and maintain and extend the works constructed thereon. Permission to carry out additional works was given to the Grantham, Pontypool, Pontypridd, and South Lincolnshire Water Companies; the last-named Company being allowed to purchase the undertaking of the Fen Water Company. An important Act was that obtained by the South Staffordshire Water Company, as it gave legislative sanction for works which had been constructed, as was supposed, under powers they already possessed, and authorized others, as well as the raising of further capital. Extended limits and more money were given to the West Gloucestershire Water Company; and the Worksop Water Company obtained sanction and confirmation for works already constructed, and authority to raise more capital. Additional works were proposed in the Bill; but they were abandoned. With regard to the Local Authorities and other bodies who have obtained parliamentary powers, their Acts were noticed as recently as the 30th ult. It may be mentioned, however, that the Corporation of Cardiff obtained an Act (only recently Royal Assented) authorizing the construction of an impounding reservoir and other works in the county of Brecknock; that the Risca Urban District Council were empowered to acquire the undertaking of the Western Valleys (Monmouthshire) Water and Gas Company, and supply water and gas in their district and in adjacent places (the construction of the existing water-works being confirmed); and that a Water Board was constituted for the urban districts of Stourbridge, Lye, and Wollescote, in Worcestershire, and Amblecote, in Staffordshire, with power to acquire the Stourbridge Water Company and construct additional works. The first meeting of the Board took place on the 19th of October. Extensions of limits and authority to construct additional works were granted to the Llanelly and Watford Urban District Councils; the enlarged limits in the latter case being as much of the Council's district as is not within the area of the Colne Valley Water Company. A Bill was introduced for the constitution of a Water Board for the county of Glamorgan. Among the proposals of the Bill was the acquisition of five water undertakings and the sources of supply of certain local authorities. After a long inquiry, the Bill passed the House of Commons, in spite of an attempt made by Mr. Keir Hardie to have it rejected. It went up to the House of Lords and was again considered for several days towards the end of July; but in the end their Lordships unanimously rejected the measure, though they appeared to be of opinion that the county would at some future time

require a comprehensive scheme for the provision of an increased water supply. In the course of the proceedings on this Bill, Mr. Pretyman obtained an order from the House instructing the Committee to inquire whether the promoters had made provision for the supply of water at reasonable rates to the agricultural community within the area, and to any person or persons from whom any existing or natural supply was or might be withdrawn owing to the works authorized. A similar instruction was ordered in respect of the Oldham and Aldershot Bills. In the House of Lords, a Bill was introduced by Lord Desborough to determine the rights and liabilities of persons supplying water under the authority of Parliament in certain cases; but it never got beyond the second reading. The Provisional Orders applied for were mainly to authorize the construction of works and the raising of additional capital. They related to Bradfield, Gravesend and Milton, Hungerford, and Kingswood; the last-named place being taken up by a new Company. This application, as well as that of the Gravesend Company, was opposed—in the former case successfully. The Board of Trade, however, granted the Orders in the other cases, subject to certain necessary modifications and amendments; the most important being the change, in the Gravesend Order, of the basis of the charge for water from rack-rent to rateable value, and an alteration of the authorized scale involving a reduction of charges in the case of the smaller consumers.

Legal Proceedings.

Turning to the legal business of the year, several interesting cases have come under the consideration of the Courts. Those in which the Metropolitan Water Board were engaged have already been noticed; and the rest do not call for comment at any very great length. Early in the year, Mr. Justice Neville had before him an application by the Attorney-General, on the relation of the Bristol Water Company, for an injunction to restrain the West Gloucestershire Water Company from supplying water beyond the limits of their statutory district, or within those limits for use outside. The dispute arose with regard to a large house —Hollywood Towers—with a model dairy, stables, &c., attached, situated partly within the parish of Henbury, in the district of the Bristol Water Company, but very near the border of the parish of Almondsbury, which is within the West Gloucestershire Company's district. This Company's main came to a dead-end near to the property, but was continued for a short distance beyond their limits to a hydrant and overflow, for the purpose of allowing accumulations of muddy water to be run off. Above this, still outside the Company's district, a service-pipe was attached to supply the house. This was the action complained of, and the question for the Court was whether the defendant Company had power to deliver water outside their district. Of course, the well-known Nine Elms gas case figured conspicuously in the arguments. It was submitted for the defendants that there was nothing to preclude them from selling water to anyone they pleased, and for any purpose whatever. The supply was given in the parish of Almondsbury; and though the meter by which it was measured was just beyond the limit, the real place of supply was not there but at the place where the water left the main. In giving judgment, his Lordship said the question before him was what was meant in the defendants' Acts by the words "supply of water." He thought they meant its delivery for use at the terminals (wherever they might be) at which the consumer took possession of it, so to speak, and devoted it to his own use. If water was brought to a point outside the Company's district, and used there, the action would be *ultra vires*. In doing as they had done, the defendants had, in his opinion, exceeded their statutory powers; and therefore he granted an injunction in the terms asked. The defendants appealed, and the matter came before the Master of the Rolls and Lords Justices Farwell and Kennedy. It was again submitted that the real place of delivery of the water was where it left the main; and that therefore the supply was not outside their district. Their Lordships, however, dismissed the appeal without calling upon the respondents' Counsel; holding that if the Acts of a Company provided that water should be supplied only within certain prescribed limits, they could not carry on business beyond them. The question of the "delivery" of water came up in another form early in the year. In a case heard at the Mark Cross Petty Sessions in the summer of 1908, the point at issue was the level at which the water was "delivered;" the supplying Company (the Crowborough Water Company) being entitled to charge 50 per cent. extra if the delivery was at a greater height than 700 feet. The Company contended that the delivery of the water took place at the cistern in the roof, which was above the 700-feet level; while the defendant argued that it was where the supply-pipe entered the house, which was below it. The decision of the Bench, consisting of four Magistrates, was against the Company; but they agreed to state a case. This was heard by the Lord Chief Justice and Justices Bigham and Walton at the Hilary sittings of the High Court. They said the point was whether or not the Company had supplied and delivered water at a higher level than 700 feet. They had so delivered it; and therefore the Magistrates ought to have allowed the full charge.

The effect of the decision in the Frimley and Farnborough case last year, in regard to the construction of works on unauthorized lands, was not only observable in the parliamentary work of the session—several of the Bills, as already mentioned, containing clauses sanctioning works already constructed—but in the Courts. Early in the month of July, Mr. Justice Ridley heard an application by the Attorney-General, at the relation of the Marquis of Salisbury, for an injunction to restrain the Barnet District Gas and Water Company from constructing or using, upon a piece of land acquired by them at Colney Hatch, "a well or other works for the purpose of raising, collecting, or storing water, and for carrying the same away for the general purposes of their undertaking." It was alleged that the well in question was outside the Company's statutory limits, and that its construction would cause injury to the relator. It was contended, on behalf of the plaintiff, that the Company had no statutory power to sink a well at Colney Hatch, which was 6½ miles from the nearest "authorized works," except as part of such works, which it was not; and, further, that no power was conferred by the Water-Works Clauses Act on people to wander about a district, purchase lands, and construct works to draw water from an unauthorized source. It was submitted by Sir Alfred Cripps that the case was undistinguishable from that of the Frimley and Farningham Company; whereas it was contended by Sir Robert Finlay, for the defendants, that it was of a totally different character. The learned Counsel pointed out that an Act obtained by them in 1904 provided that they might acquire land at Colney Hatch for the purpose of their water-works undertaking, and that upon the land so acquired they might carry out any of the works and execute any of the powers mentioned in, or conferred by, section 12 of the Water-Works Clauses Act of 1847. This, it was submitted, had exactly the same effect as if there had been set out in terms the various things specified in the section mentioned. Putting the matter shortly, Sir Robert said the question for the Court to decide was whether Parliament had or had not authorized the works in respect of which the injunction was applied for. His Lordship said it certainly had not. He nevertheless listened to the argument of the learned Counsel, who concluded by asking him not to grant the injunction, as a special agreement had been come to between the relator and the Company, before the Committee on the Bill of 1904, that permission should be given to sink the well in question. His Lordship decided that the Company had no power under their Act to do this, and if there had been any agreement between the parties the Act had not carried it out. Under these circumstances, he must grant the injunction; but he consented to a stay of execution, pending an appeal, provided the defendants would undertake to stop the work at the well. The undertaking was given, and the notice of appeal duly lodged. It came before Lords Justices Vaughan Williams, Buckley, and Kennedy early in the Michaelmas Term, and at the close of the arguments judgment was reserved. It was given a few weeks later in favour of the Company; but, unfortunately, their Lordships were not all agreed—Lord Justice Vaughan Williams dissenting from his learned brethren. The case has, however, been taken to the House of Lords. A somewhat similar question was raised in an action by the Attorney-General, at the relation of the Seisdon Rural District Council, heard in March by Mr. Justice Warrington. It was an application for a declaration that the South Staffordshire Water Company were acting *ultra vires* in using two wells and pumping-stations at Ashwood and Kingsford, in the parish of Kingswinford, and for an injunction to prevent them from continuing them. The defence was that, by section 9 of their Act of 1893, the Company were, in effect, authorized to

construct and use the pumping-stations in question, though they had not been specifically sanctioned. His Lordship made the declaration and granted the injunction as asked, but suspended it in view of the fact that defendants were applying to Parliament for statutory authority in respect of these works. Shortly afterwards a similar application was made to Mr. Justice Neville, at the instance of the Rural District Council of Lichfield, in respect of a reservoir constructed by the Company. The course taken by Mr. Justice Warrington was explained to his Lordship, and he made an order in the terms arranged. As mentioned when dealing with the water legislation of the session, the Company obtained an Act confirming these works.

Mr. Justice Parker had before him for several days recently an action brought by the Portsmouth Water Companp against the London, Brighton, and South Coast Railway Company, to prevent them from taking water from a spring, called the "Railway" spring, yielding 600,000 gallons a day, on their land at Bedhampton, near Portsmouth. The deed under which the land, which was entirely covered by water, was conveyed to defendants' predecessors contained a reservation of all water rights to the vendors, who were the owners of two estates, known as Upper and Lower Bedhampton Mill Estates, which in 1855 and 1877 were conveyed to the plaintiffs. The water by which the mills were operated was fed by various springs, among them being, as plaintiffs alleged, the one now in question. Having purchased the land on each side of the millpond, they proceeded to use the water for the purposes of their undertaking. In course of time, as the result of extensions of the railway line, an agreement was come to under which a cylinder was sunk by plaintiffs where the spring rose, and the water conveyed into a 42-inch main. The rights under the agreement continued until about two years ago, when they were determined by notice. The defendants then proceeded to put a pipe into the cylinder, and carry away the water for their own use. This led to the action. The defendants' case was that there never was a spring at the place in question from which water flowed into the millpond, but if there were, it being on their own land, they had a right to use the water from it. At all events, they said, the plaintiffs had no right to it, either as flowing water or by virtue of the reservation of all water rights to the vendors of the land under the original conveyance. A good deal of evidence was called upon both sides, and at the close of the case his Lordship reserved judgment. This he delivered on the 15th inst. in favour of the plaintiffs (*ante*, p. 824); but he granted a stay of execution to allow the necessary alterations to be made to carry his decision into effect.

In the Court of Appeal, the Lord Chief Justice, the Master of the Rolls, and Lord Justice Buckley heard an appeal from a judgment of Justices Channell and Sutton, in a King's Bench Divisional Court, reversing a decision of the Judge at the Redhill County Court, in an action brought by the Reigate Rural District Council against the Sutton District Water-Works Company (the Contractor for a reservoir being joined as a third party); the question relating to damage caused to highways by heavy traffic. In the Court below, their Lordships thought the Judge had misdirected himself; but his decision was supported by the Superior Court. A dispute between the Corporation of Bradford and Mr. T. E. E. Yorke, in regard to the construction and effect of a conveyance as to the mines near Gouthwaite Hall, in consequence of the action of the Corporation, who had acquired certain of Mr. Yorke's lands for the construction of a compensation reservoir in connection with their Nidd water scheme, was settled by the House of Lords, who dismissed an appeal by Mr. Yorke against a judgment of the Court below reversing one by Mr. Justice Joyce. Early in 1908, Mr. Justice Lawrance and a Special Jury were occupied for eleven days in trying an action brought by Dr. Fergusson, the proprietor of a hydropathic establishment at Malvern, against the Urban District Council, for damages for alleged nuisance in allowing his drinking water to be polluted by sewage escaping from their sewers, whereby an outbreak of typhoid fever in his Hydro. was caused, from which two of the visitors and two servants died. He was successful in his action; but the Council appealed, mainly on the ground that, upon the findings of the Jury, the verdict given was against the weight of evidence. They also submitted that the Jury had been misdirected. The Court of Appeal failed to see any breach of duty on the part of the Council, and they decided that judgment should be entered for them, with costs. The case was, however, taken to the House of Lords, where it was heard last May. At the conclusion of the arguments, the Lord Chancellor said the appellant had failed to show any ground for interference with the decision of the Court of Appeal; and Lords Macnaghten, James of Hereford, and Shaw concurred. The appeal was accordingly dismissed. In connection with this case, reference may be made to a paper by Professor W. R. Smith, M.D., dealing with the outbreak, read before the Association of Water Engineers at their winter meeting in 1908, and given in the first number of the "JOURNAL" this year.

Among the other legal cases of the year, the following may be mentioned. Two water consumers at Torpoint refused to pay the increased charges of the Urban District Council for water supplied for trade purposes, on the ground that, under the Public Health Act, local authorities were not entitled to levy any charges for water beyond those actually required to cover the expenses of the supply, and that it was illegal to attempt to make a profit out of the water-rate for the reduction of the general district rate. The Bench declined to make an order in either case. A house-owner at Slough was fined £9 9s. 6d. for altering a service-pipe supplying a row of houses in a way to render the water liable to contamination. A question came before the County Court Judge at Bradford-on-Avon as to whether the Wiltshire County Council were liable for a sum of £13 4s. 10d. for water supplied to the Adcroft School at Trowbridge, which was a non-provided (voluntary) school, by the Trowbridge Water Company. The whole question turned on the construction of certain sections of the Education Act of 1902, which constituted the Council the education authority. The defence was that the managers of the school, to whom, previously to the Act coming into force, the water was supplied, were liable. But his Honour decided to the contrary; and his judgment was upheld by Justices Bigham and Walton in the King's Bench Division. In the review of the legal work of the year 1908, it was mentioned that the owner and part occupier of some premises at Earby recovered compensation from the Earby Water Company for damages sustained by him owing to the cutting off by them of the water supply to a hydrant at a weaving-shed, with the result that it was impossible to extinguish a fire which occurred there a few weeks afterwards. The Company appealed, and the case came before Lords Justices Vaughan Williams, Buckley, and Kennedy. The grounds of the appeal were that the verdict was against the weight of evidence, and that, on the findings and the admitted facts, the defendants were entitled to judgment. Their Lordships came to the conclusion that at the time the fire occurred there was no obligation on the part of the Company to supply water, the service having been properly discontinued, and that consequently the appeal ought to be allowed. Judgment was accordingly entered for the Company, with costs of the appeal as well as of the trial in the Court below.

ARBITRATIONS.

Being somewhat in the nature of legal proceedings, brief reference may be made here to some arbitration cases of the year. The first was to determine the price to be paid by the Birkenhead Corporation for the compulsory acquisition of land on the Hafod Elwy and Taincha Estates, Denbighshire, owned by Mr. A. O. Evans, required for carrying out the extensive scheme of additional water supply sanctioned by the Corporation Act of 1907. The price asked by the claimant for 2039 acres was £100,000; and the witnesses for the Corporation valued the property at about £9000. The Umpire (Sir Edward Clarke) awarded £26,518—being £26,168 for land and £350 for easements. In an arbitration in respect of the value of some land required by the Penrith Urban District Council for the construction of a reservoir the questions were raised as to whether the Arbitrator (Mr. C. R. Fenwick, of Leeds) was entitled to award compensation for its special adaptability for the purpose in question, and whether it could be given when there was only one person (the Council) in the market, and that person possessing compulsory powers. These questions were put in a case stated for the opinion of the High Court; and the matter duly came before Mr. Justice A. T. Lawrence. The Arbitrator awarded £1822 if there was special adaptability, and £312 if there was none. His Lordship pointed out that the Arbitrator had not stated a case but arrived at a conclusion; and he held that the award was correct at the higher amount. Early in the year, an inquiry was held in London, before Mr. Pollock, one of the Official Referees, respecting a claim made by the Manchester Corporation

against the New Moss Colliery, Limited, for about £81,500 for damages caused to their Audenshaw reservoirs by the Company's mining operations. After the proceedings had been opened, the parties came to a settlement. It was agreed that defendants should pay £17,500, in three instalments on dates specified, and the costs of the inquiry.

Technical Business.

Coming to the technical matters connected with water supply which have engaged attention during the year, the two meetings of the Association of Water Engineers claim first attention. At the summer meeting, held in Durham in June, under the presidency of Mr. Robert Askwith, M.Inst. C.E., the Engineer to the Weardale and Consett Water Company, the members received a cordial welcome from the Mayor (Mr. John F. Boyd, J.P.), who expressed his pleasure at finding that Mr. Askwith, who was an old and valued friend of his late father, and who had worked with him for many years in the interests of water supply, was President for the year; and he wished him every success during his term of office. At the opening of the President's Address, it was announced that the membership of the Association had increased from 332 in 1907 to 365—or 33 in the two years—which it was thought might be regarded as a very satisfactory feature of their progress. The President touched upon various useful topics in the course of his short address—the consumption of water per head, the stamping and insurance of fittings, the new Model Code of Regulations, the prevention of waste, the use of reinforced concrete in construction work, and the employment of suction-gas plant for pumping purposes. The last-named subject was also dealt with in a paper by Mr. D. Hastings Irwin. The other papers prepared for the meeting were: "Steam-Driven Pumping Plant for Deep Wells and Boreholes," by Mr. A. Towler; "The Selby New Water-Works," by Messrs. Percy Griffith and Bruce M'Gregor Gray; and "Public Water Supply for Fire Extinguishing," by Mr. C. W. S. Oldham. With the exception of the last, all the papers were read and well discussed. In connection with the meeting, visits were paid to the offices and workshops of the Newcastle and Gateshead Water Company, of which the President is the Consulting Engineer, where they were received by the Engineer (Mr. A. L. Forster, M.Inst.C.E.); and to the reservoirs of the Weardale and Consett Water Company, which were inspected under the personal guidance of the President. At the winter meeting, held on the 10th and 11th inst., under Mr. Askwith's presidency, Mr. Oldham's postponed paper was taken first (see *ante* p. 809). The other papers were: "Evaporation from Water Surfaces," by Mr. S. R. Lowcock, M.Inst.C.E.; "A Sterile Boring in the Inferior Oolite (Somersetshire)," by Mr. W. Phelps; and "Ferro-Concrete as Applied to Water-Works Construction," by Mr. Harry W. Taylor, Assoc.M.Inst.C.E. A paper on "Reservoir Outlets" had been promised by Mr. G. N. Yourdi; but, owing to illness, he had not been able to finish it in time for the meeting. It is postponed till the summer meeting, which will be held in York, the home of the new President, Mr. W. H. Humphreys, the Engineer and Secretary of the York Water Company. The Chairman of the Company (Sir Joseph Sykes Rymer) was present, and expressed his gratification at the election of Mr. Humphreys, and said it would be a pleasure to his colleagues and himself to meet the members in the coming summer. A feature of the meeting was the passing of a resolution approving and endorsing the action of the Committee of Municipal Trading Departments in their opposition to the proposed "centralization of the control of their accounts."

Some interesting subjects were considered at the meeting of the German Association of Gas and Water Engineers, held at Frankfort-on-the-Maine in June. Herr Reese, of Dortmund, read a paper on the "Development of Water Supply during the last Fifty Years;" Dr. Steuer, of Darmstadt, dealt with the "Origin of Underground Water," with special reference to the plain of the Rhine in Hesse; and Herr Scheelhaase, of Frankfort, submitted a paper on the "Removal of the Acidity of the Underground Water of the Frankfort Forest." At the annual meeting of the New England Water Association, a Committee presented an interesting report on the depth of laying water-mains, extracts from which were given last week. Early in the year, members of the Institution of Mechanical Engineers had their attention directed by Mr. John Don, of Maybole, to the subject of "The Filtration and Purification of Water for Public Supply," by indicating the principal features of the paper which gained for him the "Water Arbitration" prize. An abstract of the paper was circulated, and the discussion to which it gave rise extended over two evenings. On the second, the outgoing President (Mr. T. Hurry Riches) presented the prize to Mr. Don, consisting of a certificate, a cheque, and some tools and books, and congratulated him on the work he had done. A few weeks ago, the members had brought under their notice, by Mr. H. A. Humphrey, his new internal-combustion pump, which was described and illustrated in the "Journal" for the 26th of October. The paper aroused a great deal of interest, in view of the highly favourable report made by Professor Cawthorne Unwin on an official test carried out by him of a four-cycle Humphrey pump at Dudley Port. The discussion on this paper, as in the case of Mr. Don's, extended over two evenings.

At the meeting of the Royal Sanitary Institute in January, Dr. Samuel Rideal, F.I.C., read a paper on the "Purification of Water by Ozone," in which he described the installation of plant on the De Fries system in operation at the St. Maur Water-Works in Paris. He characterized ozone as the ideal agent for purifying water, since it leaves behind it only ordinary oxygen, and nothing that is foreign to the water; and he considered it specially suitable for towns drawing their supplies from rivers. In the course of the discussion, the Chairman (Mr. E. B. Barnard, M.P., the Chairman of the Metropolitan Water Board) thought that the ozone process of purification might be of advantage in an emergency, and be very desirable; but he said its adoption would mean £90,000 a year for London. While on this subject, it may be mentioned that just about the date of the meeting the ozone process was put into operation at Chartres, a city of 23,000 inhabitants, supplied with water from the River Eure. At the Health Congress, promoted by the Corporation and the University of Leeds, with the co-operation of the Royal Sanitary Institute and the Royal Institute of Public Health, which was held in July, Dr. Rideal dealt with the subject of the "Chlorine Sterilization of Polluted Waters;" and his paper was discussed with one on "The Sterilization of Water," by Mr. H. C. H, Shenton, and another by Dr. A. C. Houston, the Director of Water Examination to the Metropolitan Water Board. Other papers were on "Mechanical Filtration," by Mr. J. Parker, the City Surveyor of Hereford; and "The Water Supplies of Yorkshire," by Mr. T. Fairley, of Leeds. Mr. C. Clemesha Smith, M.Inst.C.E., the Water Engineer to the Wakefield Corporation, described the methods adopted to prevent plumbo-solvency in his district. These papers came up for discussion in the Engineering Section, the Chairman of which was Mr. C. G. Henzell, the Water Engineer to the Leeds Corporation. As bearing upon public health, it will not be out of place to refer here to the Model Code of Water Regulations issued by the Joint Committee on Water Regulations, and given in the "Journal" for Feb. 2; and to the movement initiated by the Corporations of Lancashire and Yorkshire to retain unrestricted control over their reservoirs to ensure protection from pollution. The value of these huge receptacles was emphasized by Dr. Houston in the annual report of the Metropolitan Water Board, and noticed in the "Journal" for Aug. 17. He pointed out that the habitual use of stored water lightens the grave responsibilities of the Board in regard to the safety of the Metropolitan Water Supply, and tends to create a sense of security among those who watch over the health of the Metropolis.

Casualties.

It is again gratifying to record that the year has passed without the occurrence of many accidents in connection with water supply undertakings. The first was at the new "crib" in course of construction on Lake Michigan for providing an additional supply of water for Chicago. By some unknown means, the structure, which was of wood, caught fire, while one shift was working in a tunnel, and the men in the relief shift were asleep, and the building was soon in flames. The barriers holding the water back were quickly destroyed, and the tunnel was flooded, twenty men being drowned. The next accident was much less disastrous, though it caused considerable inconvenience. It was the bursting of a 24-inch water-main below the roadway at the foot of Putney Bridge, causing a great volume of water to pour down the High Street, and do considerable damage to property. Two skiffs from a neighbouring boathouse were launched, and rendered service to imprisoned householders; while fire-engines were brought into use for pumping the

water from the basements. The accident arose from the fracture of the pipe at a joint; and the damage was very soon repaired. Two iron water-tanks, each 60 feet in diameter and 40 feet high, and of about a million gallons capacity, constructed in 1885, failed at Parkersburg, West Virginia. They were both ripped along a vertical line, and the water liberated by the fractures wrecked a church and a large house, and seriously damaged fifteen other residences; causing the death of two people and serious injury to three or four others. The damage was estimated at about $50,000. Two accidents occurred to reinforced concrete reservoirs in Oklahoma—one due to an attempt to effect economy by reducing to a minimum the thickness of the inner walls; and the other to the corners of the basins, where the walls pulled apart, not having adequate earth backing, as the strength of the reinforced walls was relied upon to hold the water. Owing to an accident to the 36-inch pipe which is carried across the Wharfe on a stone aqueduct in the neighbourhood of Bolton Abbey, the supply of water to Bradford was interrupted early in the morning of the 19th of July. At a point where the pipe makes a bend upwards, a subsidence of the ground caused one of the joints to draw, and the liberated water led to the displacement of several adjacent sections. Later in the day, the Corporation Water Engineer (Mr. J. Watson) inspected the damage, and the necessary repairs were undertaken.

Personal Matters and Deaths.

Before bringing this retrospect to a close, a few personal matters which have occurred during the year call for brief notice. Mr. J. F. Bedford, of Leeds, was appointed Water Manager to the Colne Corporation; Mr. E. W. Booth, of Croydon, was selected for the position of Engineering Assistant in the Water Department of the Bolton Corporation, and he accepted it, but afterwards resigned; Mr. Lees Buckley was appointed Secretary and Collector for the Ashton-under-Lyne, Stalybridge, and Dukinfield District Joint Water Board, in succession to Mr. W. H. Rothwell, who had been Secretary since 1878, and was retained as consultant-adviser; Alderman W. J. Burgess retired from the Liverpool Corporation, in which for some years he held the position of Chairman of the Water Committee; Mr. J. Diggle, of Heywood, was appointed Borough Surveyor and Water-Works Engineer to the Hyde Corporation; Mr. G. B. Gibbs succeeded Mr. Sutherland as Secretary of the Sunderland and South Shields Water Company; Mr. J. C. Hawkins, of Cardiff, was appointed Chief Water Engineer to the Paignton Urban District Council; Mr. J. S. Ineson, the General Manager and Secretary of the Ventnor Gas and Water Company, was presented by the Directors with a framed illuminated address, together with a gold watch and chain, in token of their hearty appreciation of his "valuable and faithful services" for twenty-five years; Mr. S. Marsland was appointed by the Metropolitan Water Board Assistant District Engineer of the Kent district; on the 3rd of April, Mr. C. Sainty, the Manager of the Windsor Water-Works, completed thirty years' service under the Corporation; Mr. J. W. B. Simpson, the Accountant of the Chesterfield Water and Gas Board, is now styled Accountant and Commercial Manager; and Mr. J. W. Sutherland, the Secretary of the Sunderland and South Shields Water Company, was presented with a silver salver and a cheque for fifty guineas, to mark the completion of his fifty years' service with the Company.

During the year we have unhappily had to record the removal by death of several gentlemen closely connected with water undertakings—viz., Mr. George D. Bellamy, Consulting Water Engineer to the Plymouth Corporation; Mr. George Crowe, Engineer of the Chester Water Company; Mr. George Frederick Deacon, the well-known Water Engineer; Herr M. Dietrich, the Manager of the Munich Municipal Water-Works; Alderman Thomas Goldsworthy, the Chairman of the Water Committee of the Newport (Mon.) Corporation; Mr. William Goldsworthy, formerly Manager of the Hampton station of the Metropolitan Water Board; Mr. Robert Hodgson, the Outdoor Manager of the Sunderland and South Shields Water Company; Sir Theodore Martin, the Chairman of the Brymbo Water Company, and a distinguished member of the Parliamentary Bar; Mr. W. A. Piercy, the Manager of the South Hayling Water-Works; Mr. R. H. Swindlehurst, the Water Engineer to the Bolton Corporation; Mr. W. A. Valon, the well-known Consulting Gas and Water Engineer; and Mr. Joseph Wren, the Vice-Chairman of the Boston (Lincs.) Water Company.

PARLIAMENTARY MUNICIPAL TRADING RETURN.

Further progress has been made with the publication of the return regarding municipal trading in the United Kingdom which, as "Journal" readers have already been made aware, is being prepared at the instance of Mr. L. G. Chiozza Money, Member for North Paddington. The "further progress" here referred to, of course, relates to the issue of another one of the series of volumes into which it has been found necessary that the return should be divided. The present is the fourth volume to be published, but strictly speaking not the fourth in the series, for it is numbered Part III. Parts I. and VI. were noticed in our issue for June 22 last; while Part II. was similarly dealt with on Sept. 21. Now another part is before us, just about three years after the return was moved for—and, of course, there are still some more to come.

It is necessary to recapitulate here, very briefly, what the return is intended to show, even though we may be unable to state with absolute certainty the reasons which made it appear to the originator of the idea desirable that it should be so shown. The object is to set forth certain trading statistics for the London County Council, the Corporation of the City of London, the Council of each Metropolitan Borough, the Corporations of the Municipal Boroughs of Liverpool, Manchester, Birmingham, Leeds, Sheffield, Bristol, Bradford, West Ham, Newcastle-upon-Tyne, Kingston-upon-Hull, Nottingham, Salford, Leicester, Portsmouth, Bolton, Cardiff, Sunderland, Oldham, Croydon, Blackburn, Brighton, Derby, Preston, Norwich, Birkenhead, Gateshead, Plymouth, Halifax, Southampton, South Shields, Burnley, East Ham, Huddersfield, Swansea, Wolverhampton, Stockport, Middlesbrough, Stockton, and Blackpool, and the Edinburgh, Glasgow, Dundee, and Aberdeen Corporations. It is to indicate the nature and extent and, for each of the last four years for which figures are available, the financial results of reproductive municipal undertakings, including for each undertaking separately "a short description thereof, date and terms of original acquisition or establishment or subsequent extension, how managed, capital employed and how obtained, value of the undertaking, capital paid off and outstanding, loan charges, provision for depreciation, gross income and expenditure, net profit or loss, how profit is allocated or loss met, amount of relief or burden to rates, number and salaries of the chief paid officials, number of work-people, rate of wages paid in chief classes of labour, and prices charged for products or services supplied or rendered." In a memorandum attached to the return, it is pointed out that the municipal boroughs in England and Wales mentioned above are all those which at the date of the Census of 1901 had a population of upwards of 90,000—with the addition of two (Stockton-on-Tees and Blackpool) which have a smaller population. When noticing Part I., some particulars were given with regard to the form in which the information was asked for and has been supplied in the return.

The municipal boroughs included in the present volume are: Birmingham, Nottingham, Leicester, Derby, Wolverhampton, Norwich, West Ham, East Ham, Croydon, and Brighton. With regard to these ten boroughs, the number of reproductive undertakings which fall to be included are respectively: Birmingham eight, Nottingham six, Leicester seven, Derby six, Wolverhampton seven, Norwich four, West Ham four, East Ham four, Croydon eight, and Brighton nine. Gas supply is included in the cases of Birmingham, Nottingham, and Leicester; and water supply in those of Birmingham, Nottingham, Leicester, Derby, Wolverhampton, Croydon, and Brighton. In all ten boroughs the electricity supply is a municipal one; and in nine of them there are tramways owned (though not in all cases worked) by the Council. In seven instances markets appear; and in all ten boroughs there are municipal baths. Eight of them have working-class dwellings among their reproductive undertakings; while Derby includes cemeteries, Wolverhampton cold stores and an ice manufactory, Norwich allotments, Croydon lodging houses, slaughter houses, and allotments, and Brighton telephones, an aquarium, and an abattoir. Surely there is variety enough here to keep even the most easily wearied student interested.

During the four years mentioned in the return—1902-3, 1903-4, 1904-5, 1905-6—the Birmingham rates received about £200,700 from the gas undertaking, £12,100 from markets, and £500 from workmen's dwellings. In Nottingham, the gas undertaking contributed some £106,000, the electricity works £28,000, the tramways £63,000, and the markets £20,000. In like manner, Leicester benefited to the extent of £144,000 from the gas-works, and £13,300 from the markets. At Derby, the markets have handed over to the rates £10,000. The Wolverhampton water-works have contributed £2670 (all in the year 1902-3), and the markets and fairs £16,700. The Norwich markets have handed over £9000, and the working class dwellings and allotments £19 (in the year 1905-6). It will be remembered that in the statistics issued by Mr. J. Carter, the Borough Treasurer of Preston, a few weeks ago, out of a representative list of 94 towns and boroughs, Norwich tied with East Ham for top place in regard to the amount in the pound levied for rates—the figure shown in each case being 9s. 11d. These statistics referred, it should be pointed out, to the year 1909; and so are much more recent than the period to which the present Blue-Book relates. As, however, the latter document shows that Norwich has only four "reproductive undertakings"—that is, electricity, markets, baths, and dwellings—and

of these a small profit has only resulted on two, while the electricity undertaking has shown a surplus since it was acquired, it seems one must look elsewhere than in the direction of municipal trading for an explanation of the high rates. The West Ham rates have received £15,000 from the tramways undertaking; and those in East Ham, £1750 from the electricity works (all in the year 1905-6), and £5250 from tramways (also in 1905-6). From the water undertaking at Croydon £4800 has been handed over, from the electricity works £4000, from the tramways £2000 (all in 1902-3), from the working-class dwellings £76 (in 1905-6), and from the allotments £92 (in 1902-3). The Brighton rates have received £25,000 from the water undertaking, £3250 from the electricity works (all in 1903-4), £3050 from the trams (in 1903-4), and £2000 from the markets.

These are merely the "rate relief" figures extracted from the 200 pages of tables and statistical information of which the Blue-Book is composed. They show that out of the sixty-three "reproductive" undertakings owned by the ten municipal boroughs whose returns are included, not more than twenty-six during the four years mentioned contributed any sum to the reduction of the rates. In only three of the boroughs is the local gas undertaking in the hands of the municipal authorities; but the profits taken from these for the benefit of the rates reach a figure which seems to about double the receipts from all the other twenty-three undertakings put together. Next in order are tramways, with £88,000; markets, with £83,000; electricity, with £37,000; and water, with £33,000. Of the total number of undertakings included in the return, some twenty-five are of such a nature that it may be assumed they were started quite apart from any question of profit-making—such as workmen's dwellings, baths, cemeteries, and abattoirs, and other things of a similar character.

It does not appear that the member at whose instigation the returns are being compiled expressed any desire that the figures relating to the different boroughs should be summarized in one table; and thus it would take a long time to arrive at the total amount of capital involved in the number of undertakings dealt with. It must, however, manifestly be enormous; and when the results from the three gas undertakings, at Birmingham, Nottingham, and Leicester, are deducted, the figures cannot be very helpful to him for the purpose of demonstrating the success of municipal trading from a profit-earning point of view—which it is surmised (perhaps wrongly) was one of the principal points in mind when the return was ordered by Parliament. While, however, referring thus to the profit-making side of the question, it may be well to repeat the remark made when noticing the last preceding volume of the series—that we do not regard the extent of the rate relief as any adequate test of the success or otherwise of municipal trading enterprises. It is not, in fact, the standpoint from which the question should be even mainly judged—for if it is wrong to speculate in risky concerns by which the ratepayers may become heavy losers, it is little better to take from the consumers for the benefit of the general body of citizens the profits of undertakings in connection with which risk to the pockets of the latter is non-existent.

Inspecting Gas Examiner for the London County Council.—At the meeting of the London County Council last Tuesday, the Public Control Committee recommended that an inspecting gas examiner be appointed in the chemical and gas-testing department, and that his duties be to inspect the several gas-testing places in London, make non-statutory tests of gas and statutory tests in cases of emergency, and perform, under the direction of the Chemist, other work falling within the province of the Council as the controlling authority. The Committee also recommended that Mr. B. R. James, a relieving gas examiner, who has been employed temporarily on the work, should be appointed as from the 1st prox., at the commencing salary of £162 10s. a year. The recommendation was adopted with discussion.

Cost of Working a Gas-Power Plant.—At a recent meeting of the Royal Scottish Society of Arts, in Edinburgh, a paper, entitled "Some Recent Developments in the Use of Producer Gas for Power Purposes," was read by Professor R. Stanfield, of the Heriot-Watt College. It was stated, in connection with the working of a gas-power plant of about 30 B.H.P. capacity, that the total cost, including fuel, wages, maintenance, depreciation, interest on capital, rent, taxes, &c., amounted to less than ½d. per actual horse power per hour. There seemed to be no doubt, the author considered, that the use of gaseous fuel, for power and heating purposes on a large scale, was steadily but surely advancing, and the time was not far distant when large plants would be erected near great industrial centres to supply a cheap gas.

The Spelling of the Name of the Inventor of Gas Lighting.—Questions have been raised from time to time in regard to the spelling of the name of the inventor of gas lighting, which some have asserted should end with a "k" and not with an "h" as is usual. If we remember rightly, the former spelling is the one adopted in the "Dictionary of National Biography." An article in the "Engineer" for the 17th inst. sets the matter at rest. It is entitled "Some Recollections of the Soho Foundry, its Men and Methods;" the author being Mr. Charles H. Wall. In the course of it, he gives a facsimile reproduction of an autograph letter dated Dec. 20, 1805, and bearing the signature of "Wm. Murdock." The text of the letter shows so clear a distinction between "h" and "k," that no room is left for further doubt as to the spelling which the owner of the name adopted.

SOME ASPECTS OF TECHNICAL EDUCATION.

By Norton H. Humphrys, Assoc.M.Inst.C.E., F.C.S.

Those who are in the habit of attentively following our technical literature, or of attending public functions connected with our industry, must have had the matter of Technical Education very much on the brain during the last few months. It is not one of the many new features of the Nineteenth Century, but is as old as our industry itself, though now coming to the front in a change of clothes. An enormous amount has been written and spoken on the importance of higher technical training, for some time in regard only to responsible heads or controlling powers of gas undertakings; but latterly the subject has tended to filter downwards, until now it appears to be generally accepted that even the office boy might know a little more, to his own advantage, and to the benefit of the concern he is serving. When we look for what has been done, however, we are reminded of Falstaff's tavern bill—5s. 4d. for sack, and ½d. for bread.

The average gas-works employee is certainly much better educated than his grandfather was—that is to say, in a general way. He can write a fairly legible, if not a good, hand; he can figure; and he is not a stranger to a few of the "ologies." He has also benefited by the traditions of the elders, gathered while he was a boy at home—assuming that he is a member of a gas family. But apart from general advancement in education, and from the fruits of practical experience, he is not in a much better position as regards facilities for specializing in his own particular line than was his grandfather (say) fifty years ago. No inaugural address has been considered complete without a page or a paragraph dealing with the subject; and it would be difficult to turn up a volume of our special serial or other literature that did not contain pointed references to the need for better or more thorough technical education. Yet it is only recently that a Chair of Gas Engineering has been inaugurated at a University, or the classes especially devoted to the technical training of employees have taken tangible shape. There have been, in isolated cases, some endeavours in the direction of classes or courses of lectures; but they were the exception rather than the rule.

When there is much talk and little do in connection with any project, careful examination usually elicits the fact that there are difficulties, possibly of a formidable nature, that are not evident at first sight. The commencing exercises are proverbially easy; but the asses' bridge is encountered in many other things beside Euclid. The great hindrance to the advancement of technical education in our industry, has been the lack of some detailed explanation as to the meaning of the term. It has been nothing but a blessed Mesopotamia to many. There has been plenty of generality, but nothing definite—such, for instance, as a full scheme or syllabus of the course of study to be taken up by a beginner. The Council of the Institution of Gas Engineers, with the aid of gentlemen who have some experience in setting questions and examining students, whose services and assistance they could readily secure, might do something towards remedying this defect. As it is, the young beginner has had to blunder along in the dark. If he had the good fortune to be the son or relative of a gas engineer, or an articled pupil, he may have obtained some useful advice based on individual experience; but many of the older generation could scarcely set out a scheme suited to present-day needs, or give a connected account of how they acquired their own knowledge. Like Topsy, all they could say was that they "growed" into it. In the lack of assistance of this nature, there is nothing other than the desultory perusal of books, or attendance at the local mechanics' institute or science and art classes, to take up subjects such as chemistry, building construction, drawing, &c. Many of these are rather matters pertaining to general than to special technical education as generally understood. What is needed is reliable and competent advice as to a proper course of study, having regard to the student's present standard of general education, his environment in life, and his future prospects.

There are now in our chief cities excellent facilities in the form of evening classes, not only as regards general but also in special technical lines of education; but in towns of 20,000 inhabitants or less, the opportunities, even to-day, are very meagre. Every student does not enjoy the advantage of residing at or within easy distance of some large centre. There are many, scattered throughout the length and breadth of the land, earning their living in subordinate positions in connection with small gas undertakings, who have neither time nor the means to avail themselves of such advantages. But the small gas-works have always given a good account of themselves, both in the matter of passes at examinations, and in furnishing representatives in the higher walks of the profession. Many who have deservedly attained to the position of shining lights and leaders in our industry, commenced their career in the service of a small undertaking. Given energy and determination, together with some natural aptitude, a small gas-works offers educational facilities that are not readily outstripped, even with the aid of the best modern resources.

The lack of definiteness or clearness as to outlining schemes for study, also extends to the qualifications of the perfectly educated man—if one can imagine such an individual. Following the lines of some earlier utterances on the subject, it would appear that "the more the merrier," and that the acme of perfection might be expected when the whole staff, from the day labourers and office boys upwards, were so highly charged with technical

information that each individual could, if desired, take up any and every department and run it to the best advantage. Artemus Ward, I believe, somewhere describes an army composed of such smart individuals that it was impossible for one to be in any respect less than another, and therefore the lowest rank was necessarily that of a General. We do not know how Lord Roberts or Lord Kitchener would regard such an army from a practical point of view. But it is safe to say that if a qualified gas engineer was called upon to control a gas-works staff of this character, there would soon be some important changes in the *personnel*. Following an example recently quoted, "there would be several vacancies for less educated men."

History repeats itself. In my young days, the junior of an inquiring turn of mind was frequently cautioned against wanting to know too much, and advised that too great a thirst for knowledge would bring him to a bad end. This was simply a bucolic way of reminding the student that, if he would be successful, he must specialize, or, as we say now, that he requires some special technical education. The lad in the office was expected not to take more than a very casual interest in the retort-house; and the gas-fitter's mate knew better than to pry into the secrets of the engine-room. The same thing applied to every department. The works, the office, and the out-door staff were all adjured to mind their own business. "Every shoemaker to his last" was a frequently quoted proverb, and more than that, was generally acted up to, which is not always the case. But later, this sort of thing dropped entirely out of sight. The beginner was told to learn everything and anything, and sometimes, as a consequence, learned nothing. It is possible to extend the area of operations at the expense of the foundation; and when superficiality takes the place of thoroughness, the result is not a success. But, after many years, there is a tendency to hark-back to the old cry. We are reminded that there is such a thing as over-education. At one time the complaint was "ignorance." Now it is recognized that there is such a thing as too much knowledge.

The number of gas-works in Great Britain is limited. Suppose we take it at 2000. Obviously, there cannot be more than 2000 managers of gas-works holding office at any one time; and taking the average tenure of office as twenty years, there will not be more than 100 retiring each year—that is, not more than about 100 vacancies for new comers. Also we must remember that the period for obtaining office is now limited to a very few years. If the candidate is under thirty years of age, he is too young; if over forty, he is too old. Of the total number of qualified candidates for office to-day, not more than 1000 have any reasonable prospect of success. We have all heard about the French officer who said that every soldier carried a marshal's baton in his knapsack; and it is well that the young beginner should feel that he will not be hampered in any laudable endeavour to qualify for an improved position. But he should not be deceived, or allowed to deceive himself, into the idea that the process of climbing is easy and the end certain.

The actualities of the present should not be obscured by the possibilities, or the assumed possibilities, of the future. In the early days of the industry, it was the sole end and object of every ambitious subordinate, whatever his status, to rise to the position of chief; but it is now becoming evident that there are not enough chieftainships to go round. With an appreciation of this fact, the question of technical education tends to move from the general towards the particular, and from one subject to a large number of divisions or classes. Instead of now advising every learner to swallow and endeavour to assimilate, so far as his abilities will allow, the whole of "Clegg" or "King's Treatise," he is recommended to take up a section or even a single chapter. He is assisted to specialize in his own particular department, or in the one that is best suited to his abilities. If there are but comparatively few openings at the top of the tree, there are a larger and increasing number that offer good promise. With the enlargement of the industry there is a corresponding extension in the number and in the importance of the several departments; and the head of one of these departments may occupy a more important position than the chief of fifty years ago.

There may be something to be said in favour of free competition in technical education as in any branch of trade, and of encouraging 1000 or 20,000 to qualify for a position that, as already stated, may not offer more than 100 vacancies a year. The position may tend to the immediate pecuniary benefit of directors and shareholders, as enabling them, under the stress of competition, to secure efficient services for the ridiculously inadequate remuneration that is at times offered in advertisements. It may furnish an effective rejoinder if the manager, after having increased the business and profits some 50 per cent., ventures to suggest that the amount of his salary might be "reconsidered," because no reasonable man, knowing that there are hundreds waiting to jump into his shoes on bread-and-cheese terms, can expect a liberal appreciation of the time and ability he has devoted to the work, or that, in return for giving up the best and most active period of his career to the interests of the company, he will get a reward sufficient not only to cover his present contingencies, but also to leave some provision against ill-health or old age.

If the result is not in all respects satisfactory to the man in office, it is still less so to the unfortunate majority who are unsuccessful; and it does not tend to the real welfare or improvement of the industry. The successful candidate will not be likely to advertise the industry or recommend it to those who are seeking a means of livelihood; while the unsuccessful, looking upon his technical skill and training as stock-in-trade for which he has failed to find a market, will work in the other direction. The board may announce with some pride that they had 387 candidates for the post, from which it would appear that the successful one must be somebody in particular. But the other 386 are deserving of some consideration. It is interesting to think of the amount of human nature contained in those 387 applications. The perusal of them is not altogether a pleasure. The whole of the applicants are not out of a job; and the majority perhaps only desire to go one better. A considerable proportion are of the character of sporting offers, but not unfrequently tinged with a desperate earnestness. After a fair weeding process, however, there remains a mass of technical ability running to waste. The great need of the present day is not so much in the way of attracting newcomers into the profession, as to find some method of utilizing the abilities of the capable, but unsuccessful because crowded out, applicants. One hears of men with every advantage of influence in their favour who have to wait years for their position; and while this sort of thing exists, the best talent will not be attracted to the profession. The best talent considers that the prospect of being one of the 387 is not good enough.

The surplusage of candidates, as compared with the available vacancies that offer, is, unfortunately, not confined to the gas profession, but is noticeable in connection with any line that affords a prospect of a bare living and a respectable position, and is therefore in sufficient popular repute to become one of the professions. And by the word profession, I understand a calling to which young men enter as articled pupils by the payment of a more or less substantial money premium. The lament of the 386 becomes louder and louder every year. There are always practitioners and teachers who consider the value of the premium to themselves, but not the position and prospects of the student at the end of the term. And there are numbers of qualified men who kick their heels in idleness or in some trivial occupation for years—the best and most active years of their life—before they can obtain a suitable outlet for their abilities. Many find that it is necessary to throw over their prospects and try cattle-raising or wheat-growing in the Colonies, or, what is worse, drift into the ranks of the unemployed. The popular idea of the unemployed is associated with rags, dirt, and incompetence; but there is silently and unobtrusively growing up among us a new class of unemployed. They do not blatantly advertise themselves, or promote hunger marches or mass meetings; and their needs are not the less urgent because they take no place in the charitable efforts of the public. The oft-used term "the poorer class" needs considerable revision.

I may be reminded that much of this has nothing to do with technical education. But any scheme of education—technical or otherwise—that turns the student loose on the world and washes its hands of him at the end of his scholarship, is a weak, incomplete, and knock-kneed affair. If there was more evidence, on the part of those who hold the purse strings, of a desire to encourage technical skill, by the application of a system more human and more sympathetic than the hard laws of supply and demand, there would be no need for urging the importance and otherwise recommending the same. Candidates of the best order would be glad to enter.

I take it that the object of technical education is to make the stoker a better stoker, the engineer a more qualified engineer, the gas-fitter a neater and more scientific workman, and the whole a better paid, more intelligent, and more contented class, rather than to create aspirants to positions that at the best only a small proportion can hope to attain, and for which, it might be added, some are in no sense fitted. It is strange that education is confined exclusively to the development of the brain. While intellect is developing, muscle is degenerating. We should never be able to do entirely by machinery; and there will always be the demand for the man with the strong arm. It is possible that the philosopher who could teach the best way of using a shovel, having regard to the result accomplished, and the expenditure of force or energy, would be a greater benefactor to his race than one who establishes and endows a technical college.

The Secretary of the Royal Society of Arts (Sir Henry Trueman Wood, M.A.) sends a copy of a pamphlet he has prepared for the information of members and others interested in the Society's work. He says that for some time past the idea of preparing a history of the Society has been under consideration; but it has never come to anything. Pending the realization of such an idea, he has thought that it might be useful to collect a certain amount of information about the Society which has hitherto only existed in a scattered form, or in the pages of the Society's "Journal." The pamphlet contains a short sketch of the Society's history, an account of the trust and prize fund it administers, a history of the examinations it has carried on for the past fifty years, a description and pictures of its medals, lists of the Albert Medallists, and of past and present officials, the Charter and bye-laws, and other general information, including a list of the proceedings of the past session, and a financial statement for the past year. If the experiment is justified by success, the pamphlet will be issued, probably with additions, another year; and it may possibly develop into an annual publication.

AIR GAS LIGHTING:

ITS ADVANTAGES, SOME OF ITS DEFECTS, AND HOW TO REMEDY THEM.

By Herbert A. Carter.

The study of new methods of lighting is one of considerable interest; and there are several growing systems which possess great possibilities. The limited extent of our coal deposits, and the way in which these will in time become exhausted, render investigation of the claims of some of these new systems of primary importance. Among other methods, the introduction of petrol as a means of supplying light has opened out a vast field for the engineer to devote his attention to; and very considerable progress has been made in the way of producing a satisfactory light from this agent, although there still remain certain obstacles in the way of this, which in some of the petrol systems have only been dealt with in a superficial manner up to the present.

The constituents of petrol render it so applicable to the production of gas by means of vaporizing that it is not surprising that petrol lighting, as a whole, is beginning to attract considerable attention, and is being adopted by different authorities for the lighting of very extensive areas. Among others may be mentioned the Royal Engineers quarters at Bordon Camp, Salisbury Plain. The form of generator used in this case was supplied by the British and Colonial Gas Lighting Company, Limited. The apparatus is admirable in its construction, having in view the large area to be lighted, and taking into consideration that petrol lighting is really now only being developed, but that it may in the near future be perfected as an absolutely reliable and economical system, some of the facts here given go far to prove.

The plant just mentioned consists of a battery of carburettors, connected in series; the petrol being supplied to the carburettors automatically in small quantities only as required. Immediately the petrol enters the carburettors, a very rich quality of gas is produced by a process of evaporation which there takes place, at the same time a stated quantity of air is introduced to the carburettors. This air is supplied by means of a rotary blower directly coupled to the carburettors, and driven by a small petrol engine of approximately ½ H.P. The constituents of the gas thus produced are in the proportion of about 98½ per cent. of air to 1½ per cent. of petrol vapour, which is the mixture that all these systems seek to produce; it being non-explosive, on account of the large body of air which it contains and the small percentage of petrol vapour. At the same time, the mixture, or the gas produced, is sufficient in quality and volume to give a very brilliant light when introduced to the ordinary incandescent ramie mantle.

This particular installation contains over 5000 feet of piping, which is carried along the roads and taken into the various buildings, and combines to make a most effective display as an independent system of lighting. It has now been in operation a little over twelve months, giving complete satisfaction; and is an excellent illustration of the possibilities to which this new system of petrol lighting may attain.

Petrol.

Petrol, as is well known, is a mineral oil; and its source of production is practically unlimited. The specific gravity which gives the best results in lighting is ·680; this producing a soft, yet brilliant, light, which, at the same time, does not allow of any deposits of carbon or other objectionable matter, which might tend to discolour the mantles, and cause obstruction in the passages of the burners—necessitating less attention and cleaning of burners, and hence ensuring longer life to the mantles.

German engineers have for long recognized the possibilities of petrol; and the light is employed in many German undertakings and in other industrial concerns on the Continent generally, which affords ample reason for its fuller investigation by British gas and lighting engineers. It is only within recent years that it has received any attention from practical persons in this country with a view to its wider utilization; and one feature in its favour is the simplicity of the plant needed in its production as compared with the manufacture of coal gas, even on a small scale, or the generation of the electric light.

The "Loco" Gas Apparatus.

Another well known, and we may say fairly extensively used, system is the "Loco" gas apparatus, which is the invention of Mr. Frederick C. Lynde, Assoc.M.Inst.C.E., of Manchester. This system is at present in operation, and giving very satisfactory results, in almost all parts of the United Kingdom, India, and the Colonies. A unique feature of the plant is the method of petrol feed. This consists of a specially-constructed glass float or globe having a central cavity or chamber, at the bottom of which is a specified quantity of mercury, which automatically controls the flow of petrol introduced at the centre of the bulb through a steel tube of small diameter. The float is balanced in a cast-iron chamber, which contains a small quantity of petrol to give the required flotation; the whole being under the direct control of the mercury seal. The chamber is directly connected to the carburettor.

As the petrol is evaporated in the carburettor, the level of the petrol in the chamber is immediately lowered, and the float, falling with it, opens the mercury seal, and allows just the necessary quantity of petrol to flow into the chamber and replace the amount evaporated. This description of feed needs no adjustment when once set; and the quality of gas produced as the result of this method of feed is always consistent, and a very good light is assured. In addition to this, the "Loco" machine itself is a really compact and strongly built apparatus, and only occupies a minimum amount of space—approximately, 3 ft. 6 in. by 2 ft. 9 in. It is also a safe apparatus, and can be fixed in almost any position in a building, as it is not necessary to store a large quantity of petrol in any part of the machine, and the petrol tank, which supplies the chamber, can be fixed outside the premises any distance from the machine. Apart from these points, the apparatus itself is mainly constructed upon the same lines as those adopted in most machines of this class.

The Loco Gaslight Company have carried out several large and important installations, among them being Stonyhurst College, in Lancashire, where upwards of 1800 lights are in use, and which has met with the full approval of the Principals of this body. An installation carried out at Illawalla, Poulton-le-Fylde, is a good example of the Loco method of petrol lighting. There are several thousand yards of piping carried through the ground on this estate; the light produced being excellent in quality, and very brilliant at the farthest point from the machine. The Midland Railway Company's locomotive sheds at Ballymena, near Belfast, have also been successfully lit by this method. Messrs. Lever Bros., of Port Sunlight, have introduced the system on their oil-seed plantations in the Solomon Islands, which goes to illustrate the confidence its merits can command. Many machines have also been sent abroad by shippers to South America, Portugal, Russia, France, and India.

The Safety of Air Gas.

It may not be generally known that air gas is the safest of all gases, owing to there being so small an amount of vapour in its composition. Further, no purifying process is necessary, either in the generation of the gas or its combustion; it being non-poisonous. Even in the case of petrol, if there should be an escape of gas no danger exists, as the gas becomes still further diluted with air; and if a naked light is brought close to such an escape, no risk is incurred, as the escaping gas will merely extinguish a light, and not ignite, for the simple reason that the gas will burn only in specially constructed burners.

The Simpitrol system of the British and Colonial Gas Lighting Company first referred to, produces a light quite free from sulphur and ammonia, absolutely smokeless and odourless, and in no way can it cause harm to delicate decorations, pictures, or furniture. It has no injurious effect whatever upon animal or plant life. The same may be said of the "Loco" and Praed systems, the latter of which will be referred to later on.

Another great advantage of petrol lighting is the fact that the consumer is entirely independent of outside assistance in the production of the gas, for the whole of the plant can be attached to the residence, and operated by any member of the household; there being no intricate parts in the machines liable to get out of order. The operation of starting the machines is quite simple. In regard to cost, a gallon of petrol can be obtained approximately for 1s.; and, when used by a reliable machine, it will produce an efficient light equalling 1000-candle power per hour at a cost of 1s. 4d. On petrol used for lighting purposes, the Government duty of 3d. per gallon is not payable.

The cost of the electric light varies in different localities from 4d. to 6d. per unit; and it is recognized that a 16-candle power incandescent lamp will use a unit in 16 hours, the cost of which, basing the price on the above estimate, would be 5d. for 60-candle power. Electric light would therefore cost 1s. 6d. for 15 hours; while an ordinary table lamp, burning paraffin, only gives a light of 8-candle power, the cost being about the same as the 16-candle power electric lamp referred to. The cost of acetylene, it may be observed, is six times more than the cost of petrol lighting, and it is claimed by the introducers of this system that, quite apart from its superiority over other systems for its brilliancy, petrol lighting is considerably cheaper than coal gas, electric light, paraffin, or acetylene.

The Praed system is another method which has made great headway, and is most simple. It consists of a small hot-air engine heated by the gas, which the plant itself generates—this being, of course, the same in the other systems referred to. It operates an air propeller, which works in a bath of paraffin to form a seal for the air; thus furnishing a full volume of air, which is passed to the carburettor. Directly connected to the shaft of the propeller is a simple pumping arrangement, which raises the petrol from the storage tank below the machine or carburettor, where it is vaporized; and at the same time the correct mixture of gas and air is passed on to the holder. The holder possesses an advantage in so much that, when filled with gas, it can be left to act as a storage chamber; thus guaranteeing an efficient supply of gas even when the machine is not in use. The petrol enters the carburettor through a small inlet at the top, which is designed to cause the petrol to be reduced to a very fine spray, so atomizing it, and keeping the supply under control. This makes the plant perfectly safe; and there is no danger of a very rich or explosive gas being formed.

Other forms of machines which command notice, and are in successful operation, are those manufactured by the Délaite Safety Gas Company and the National Air Gas Company. The motive power of the former consists of a weight apparatus; and the latter is generally constructed on the principle of the systems already

referred to. In all cases where these different forms of machines have been introduced, no difficulty has been experienced in conveying the gas long distances; and the illuminating power of the light obtained is said to be "far in advance of that produced by coal-gas."

It would be as well to state at this point, for the information of those having little or no experience of gas production by intimately mixing petrol vapour with air, that the petrol itself is the source of light and heat; the admixture of air serving only a secondary purpose. It is possible to produce a gas containing only a percentage of petrol vapour equal only to 1·4; and this can be used for both lighting and heating. But in order to obtain an efficient light, or produce heat for cooking, &c., a much richer gas would have to be used. With most machines this result can easily be obtained by regulating the proportion of air admitted to the carburettor to produce either a weak or rich gas; thus proving that these simple yet effective appliances, in the hands of those of ordinary intelligence, can be regulated and adjusted to produce the desired requirements in regard to either light or heat, while only involving a comparatively small expense.

The Motive Power.

Touching, again, on the motive power, the most satisfactory form has been found to be the hot-air engine. This consumes only a small quantity of gas, and is therefore inexpensive to run, and is usually of a simple, yet reliable, construction, and almost impossible to get out of order; while in all makes of this class of engine the wear and tear on the frictional parts has been scientifically reduced to the minimum. For these reasons mostly, it has been adopted by the manufacturers of all kinds of air-gas machines, and has fully justified its adoption. A water-motor, if it is served from a constant source, is also reliable, and can be supplied whenever water power is available. It can be recommended as a cheap motive power in first cost, though it may not work out so very cheap if the water has to be paid for.

With regard to the falling weight to serve this purpose, it is necessary to point out that, unless a considerable fall can be arranged for the weight, it is essential to re-wind up the weight many times according to the consumption of gas; and at least a 30 feet fall is desirable. In many instances this is not practicable, and therefore the hot-air engine has taken precedence over this method.

The burners used are of various types; some being constructed so that the admission of air at the burner is an impossibility; and these should always be used in conjunction with a gas plant where the correct mixtures of air and gas are guaranteed and can be relied upon. Other forms which admit air at the burners are usually adopted where these conditions are not so certain; and in the event of a rich gas being produced at the machine, and conveyed to the burner, it is necessary to admit a further percentage of air, by means of a regulator attached to obtain the required brilliancy of light. This, although not utilizing as much air as is necessary to produce the required brilliancy in coal gas, nevertheless vitiates the atmosphere, and does not give quite as good an illuminant as in the cases where the correct proportions of air and gas are generated at the machine itself.

Installations of Air Gas.

Dealing with complete installations of air gas in houses and other buildings, the question of piping, and the running of same to the various points, ought to receive most serious consideration, as in a number of instances in the experience of experts who have been directed to inspect many of these installations, which are very often carried out by local workmen, it has been found that little or no tact has been exercised beyond that required in the case of an ordinary gas installation, with the result that, although the machine has been perfect, the fact that the system of piping has not received the necessary amount of consideration and thought which is requisite to make an air-gas installation perfect, has told against the successful operation of the system, and entailed some extra expense. This matter of piping should always be entrusted to someone of undoubted experience, if satisfactory results are to be expected. It is well known that the gas is very subject to atmospheric conditions, and quickly condenses in the pipes. Therefore, in planning-out the runs of piping, great attention should be paid to the arrangement of falls and the application of a reliable system of syphonage.

In an installation of small dimensions, this matter can be easily overcome by due care being taken that the piping is arranged so as to have a gradual fall tending towards the main which is connected with the gas-machine, when a small syphon pipe with a draw-off tap can be fixed. The spread of petrol lighting causes these to be most important points to be observed; and it will be readily recognized that, in the carrying out of a large lighting system, unless due regard is paid to the matter of syphonage the result will be anything but satisfactory. Many firms advocate the use of piping of larger dimensions than the piping used for coal gas, as it has been found where a weak gas has been used that this increase in the dimensions of the piping has been necessary to obtain a good light. Again there are numerous instances where the existing lead pipes have been utilized with considerable success; the only necessary additions being the enlargement of the main from the machine and the assurance that the piping was sound and properly laid. Cases have been known where the amount of condensation in the piping, where it has been necessary to run the piping at different levels within a small radius, has been such as to prevent the passage of the gas to the various points desired.

Another question is that of the fittings. The ordinary gas-fitting can be generally used, provided that the gas-ways are enlarged to be consistent with the size of the piping to which the fitting is attached. This is a very simple matter, and can be always carried out by a local man, though many firms of fittings manufacturers have laid themselves out for the special construction of air-gas fittings; and it is advisable, wherever practicable, that the fittings should be obtained direct from one or other of these firms. This obviates the occasion of any delay or mistake arising. The extra cost of these fittings over the ordinary gas-fittings is very slight; and the difference in cost should never be considered when an installation is being undertaken.

Incandescent Gas-Mantles.

It goes without saying that the introduction of air gas has, and still is, helping to greatly increase the manufacture and sale of incandescent gas-mantles, both of British and foreign manufacture. It is very hopeful to note that manufacturers in this country have been most successful in being able to produce a mantle of the required texture and strength which is demanded for the use of air gas. The soft or non-incinerated mantle is the type which lends itself best to the purpose, and gives the most satisfactory results. The necessity for a stronger mantle to use with air gas has opened up new channels in the manipulation and manufacture of the ramie fibre material from which these mantles are made; and at the present time there are mantles on the market supplied by British firms having an average life of nine months. This is a great point, which directly affects the question of the cost and upkeep of an air-gas installation. It is pleasing to note that British firms can successfully lay claim to having produced an article much superior to any foreign manufacture at present known.

When a system of lighting is under consideration, as in many other matters, the matter of cost is of paramount importance; but reviewing the question generally, there need be no hesitation in stating that the adoption of air gas in outlying districts for the lighting of residences, schools, workshops, institutions, and public buildings, and even where the situation is close to a town, is an advantage; and the utilization of air-gas plant at once offers itself as a means to this end, that, properly carried out, and if due regard be paid to the points named, no apprehension need be entertained as to the economical advantages and satisfactory results claimed for the system being obtained.

An installation can be so arranged that, by the addition of a system of switching apparatus, it can be placed under just as effective control as an installation of electricity. The switches can be arranged in different parts of the premises to have control over single or clusters of lights, or a whole section of an installation; and, furthermore, a switch can be arranged at any given point to automatically shut off the supply of gas at the engine, and stop same, without the necessity and trouble of a person having to leave the premises to perform this duty. Among several classes of switches used for this purpose, there is an electric appliance which is supplied by batteries, and can be fixed so that, when the gas is switched on at a given point at the same time, an electric spark is generated at the burner, which immediately ignites the gas, and this at once finds its way to the mantle.

Another important outlet for the utilization of air gas is the adoption of it for the purpose of singeing yarn. Several firms have made extensive experiments in this direction with more or less satisfactory results. It must be pointed out, however, that the progress made in this direction is, as yet, in an initial stage, insomuch that the calorific value of the gas is not as great as coal gas, unless a very rich gas is produced to meet the deficiency. To illustrate this, we will assume that, should the same quality of gas be used for the purpose of singeing yarn as that used for lighting, the result will be bound to be very unsatisfactory. The 1½ per cent. of petrol vapour contains only 2 thermal units, which approximately gives only one-fifth of the heating power of coal gas. So it would be necessary to generate a mixture of air gas containing at least 7½ per cent. of petrol vapour to produce the same satisfactory results as are given by coal gas. There is, however, one great advantage to be looked forward to by the adoption by the millowner of air gas for this purpose. It is that air gas, giving off no deleterious products, would not affect the quality of the yarn, and would enable a much cleaner and whiter yarn to be secured. The same also applies to the use of air gas for laboratory purposes, and its application to the bunsen burner for the fusing and heating of metals and other substances. These are difficulties which have yet to be overcome; but, when surmounted, they will place the manufacturer of air-gas appliances in an enviable position among engineers.

Although almost all districts in Great Britain and other leading countries are fully equipped with the means of procuring coal gas, there are still large areas where it is impossible to secure this, and the only means of illuminating are the oil-lamp and candle. The introduction of air-gas plants into these districts is always looked upon as a great innovation and improvement; so that the prospects of trade in this direction are very considerable.

Some particulars in regard to the cost of installation will be of interest here. To light up a house in a country district with thirty lights, including the cost of the machine, piping throughout, fittings, and all complete would be about £50. This average holds good also for works, mills, and public buildings, except in cases

where the piping has to be taken for considerable distances, and where a high-class fitting is asked for. Save in special cases, the cost of all machines averages about the same.

Most types of machines have been approved of by the leading insurance companies. At the same time, however, it may be stated that the storage of a quantity of petrol in close proximity to the apparatus is not desirable; and this point invariably receives very close attention at the hands of insurance officials. But as most systems provide for the fixing of the petrol supply tank some distance away from the machine, objections are now seldom met with. One point which occasioned this close attention is that the small engine is usually fixed near to the carburettor or vaporizing chamber; and it being necessary that a bunsen burner should be fixed underneath the engine to generate the required amount of heat, it was thought that this method was dangerous. As, however, the carburettor is usually made of cast iron, and is securely bolted together, and never contains more than a very small quantity of petrol, which is immediately vaporized and passed along with the air into the gasholder, this objection has been overcome. The type of machine which has its storage tank immediately connected is perfectly safe, taking into consideration that the small hot-air engine and burner can be placed some distance away.

A RADIOMETRIC PHOTOMETER.

A patent, No. 22,748 of 1908, has been granted to Mr. Harry Chapman, of Sheffield, for a photometer in which the light from any source, such as an electric lamp or gas-burner, the intensity of which is to be determined, is measured by the rate at which a selected portion of the rays cause the vanes of a radiometer to rotate. The radiometer, which is not described in detail in the specification, is evidently of the ordinary type described in text-books on physics—*i.e.*, it consists of a vacuous glass globe with a rotating vane poised on the top of a fixed vertical needle. The vane is made of light rods carrying at their outer ends discs which are all blackened on one side. When light or radiant heat falls upon the discs, the blackened sides become the hotter; and if the radiant energy falling upon them is sufficient, the vane rotates. A sensitive radiometer rotates when a candle is fixed at a short distance from it, and the speed of rotation increases with the increase in the amount of radiant heat or light which falls on the vanes. Owing to the fact that the radiometer is affected by radiant heat as well as light, it is only possible to use it directly for comparisons of lights of the same kind. Thus, in the patent specification of Chapman's photometer, means are described of compensating for the variation in speed of rotation of the vanes of the radiometer according to the kind of light which is being tested at the time. The method of operating the photometer is to allow the light from the source which is to be tested to fall directly, or by reflection from a mirror, through a small aperture with a cut-off shutter, which may be suitably actuated by clockwork, so that the light is allowed to pass through the aperture for fifteen seconds or any other determined time. The number of revolutions made by the vane of the radiometer in the time during which the aperture is open, is counted. The radiometer is so placed that its wings or vanes alternately cut off and allow to pass the light from the aperture, so that the rate of rotation of the radiometer may be readily observed by counting the flashes of light as seen through an aperture which is provided for the purpose. The apparatus is described with more particular reference to the measurement of the light of electric glow lamps; but it may be adapted for the measurement of the light from a gas-burner or an oil-lamp. The results for two lamps or burners of the same class may be directly compared; but when the kind of light is changed, a new set of schedules or diagrams has to be employed in conjunction with compensating screens or shutters.

Gas and Oil Engines in Australia.—The American Consul at Melbourne, in reporting on the trade in gas and oil engines, says that though the local demand for these engines is well catered for by machinery and other merchants, there would still appear to be a wide field for further business, as gas and oil engines are being adopted in increasing numbers. Though they are manufactured in Australia to some extent, they are mostly imported; the Customs statistics for the year 1907 showing that about £160,000 worth was imported into Australia during that year, of which £110,000 worth came from Great Britain, £40,000 worth from the United States, and the balance from France.

Reports of Gas Associations for 1909.—As announced elsewhere in the "JOURNAL," this work is now ready. It appears about a month earlier than hitherto, owing to the alteration of the date of the last meeting in the year of the Manchester District Institution. The volume contains the collected reports, as given in our columns, of the proceedings at the meetings of the various District Gas Associations held during the year. The technical matter occupies 543 pages, and it is illustrated by 40 diagrams, &c., and a folding plate. Reference to any subject is facilitated by an index; and at the end of the book are given lists of the officers and members of the Associations. The volume, which is the twenty-seventh of the series, forms a useful companion to the "Transactions" of the Institution of Gas Engineers, the issue of which for this year was noticed in the "JOURNAL" last week.

JOINTS OF GAS AND WATER MAINS.

Recent accidents arising from leakages from gas-mains make it opportune to call attention to a paper which M. Gilbert read a few months ago before the Société des Ingénieurs Civils de France. His paper was entitled: "The Laying of Water and Gas Mains from a Financial and Sanitary Point of View;" and he commenced by a consideration of the subject from a hygienic standpoint—showing the risks of epidemics from infectious infiltrations into water-mains through cracks or breakages in the pipes. "For all the parts that go to make up the construction of water-works, including the mains, it is the almost invariable rule to ask for the necessary strength to ensure lasting tightness; but for the laying of the mains themselves, no condition of resistance relative to the duration of the tightness required, is insisted upon. The pipes are nearly always laid end to end, with simple packing round the pipe-joints effecting a momentary tightness, but not offering the necessary resistance and elasticity to provide for any length of time against the disjointings due to movements of the soil, to water, vibration, and shocks, &c."

WATER LEAKAGE.

The author next refers to the loss of water by leakage. "In addition to the expenses incurred through loss of water and repairs necessitated by cracks in the mains, there must be added the percentage of capital first-cost rendered useless by such leakage and the sums paid for damage caused accidentally. . . . An increase of 1 fr. per metre-run of main on the capital cost will give—capitalizing it at 5 per cent.—a supplementary outlay of 4·32 frs. after 30 years, and 11·47 frs. after 50 years; while an increase of expense of 1 fr. per metre and per year (as often arises from loss of water and repairs to ordinary main leakages) would give 69·76 frs. after 30 years and 219·81 frs. after 50 years. . . . Reckoning only 15 per cent. of water lost by leakage in leading mains, at the price of 0·10 fr. per cubic metre on an amount of 2000 cubic metres of water distributed each day in a pipe system of 20,000 metres, and 0·10 fr. per metre and per year for inspection and repair of leakages in old mains, and 1,000,000 frs. as the capital cost of a water system for a town of 10,000 inhabitants, the loss, capitalized at 5 per cent., is as follows:—

	Per Year. Frs.	After Thirty Years. Frs.	After Fifty Years. Frs.
Loss, inspection, and repairs: $2000 \times \frac{15}{100} \times 0{\cdot}10 \times 365 + 0{\cdot}10 \times 20{,}000$	= 12,950 ..	903,404·95 ..	2,846,604·25
Percentage of capital cost rendered useless: $\frac{1{,}000{,}000 \times 15}{100} \times \frac{5}{100}$	= 7,500 ..	32,407·50 ..	86,002·50
Totals . .	Frs. 20,450	935,812·45	2,932,606·75

Thus, there is lost, in 30 years, about the value of the undertaking, and in 50 years, about three times the value."

GAS LEAKAGE.

A similar calculation is then made in the case of gas leakage. "It is known," says the author, "that by methodical repairs to mains, it is possible to reduce the total loss by from 50 to 60 per cent., but that the results obtained are not lasting. As with water, cracks continually recur. Gas engineers reckon about one-third of the total loss of the works to be due to the leading mains; and they admit that the rate of leakage is at its practical minimum when it is equal to 1·5 cubic metres per metre-run of main and per year. If we admit a total loss of 15 per cent. of the make of gas, and 3 cubic metres per metre-run, as an average of the annual loss resulting from the mains, at the price of 0·12 fr. per cubic metre, 0·10 fr. per metre-run for inspection and repairs of leaks in the old mains of a system costing 1,000,000 frs., and having 20,000 metres of mains, we see that the loss capitalized at 5 per cent. becomes:—

	Per Year. Frs.	After Thirty Years. Frs.	After Fifty Years. Frs.
Loss, inspection, and repairs: $(3{\cdot}00 \times 0{\cdot}12 + 0{\cdot}10)\ 20{,}000$ =	9200 ..	641,801·20 ..	2,022,298·00
Percentage of capital cost rendered useless: $\frac{1{,}000{,}000 \times 15}{100 \times 3} \times \frac{5}{100}$	= 2500 ..	10,802·50 ..	28,667·50
Total . .	Frs. 11,700	652,603·70	2,050,965·50

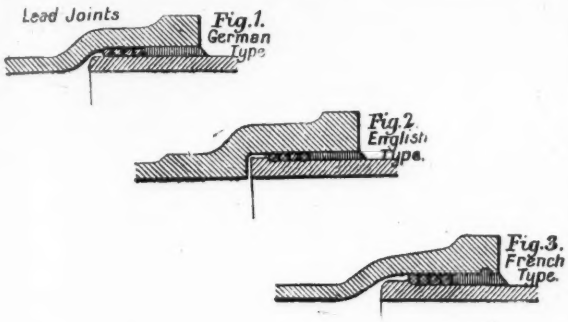
This is a loss of about 65 per cent. of the value of the system in 30 years, and of double the value in 50 years. We could show that these figures are about those of the average loss of several works where repairs to leakage are regularly attended to. The loss is much more significant in systems having 25 to 30 per cent. of unaccounted-for gas."

Accidents caused by leakages from gas and water mains are then mentioned—among the former being explosions in sewers, as at Blackburn in 1892, and in the Rue François-Miron in Paris in 1893-94. As to water, it escapes by cracks in the joints, and is undetected for some time. It softens the ground along the pipe; has a scouring effect; and causes settlements or slippings, which in turn produce further leakage in neighbouring joints. Contamination of water and loss of gas indicate that joints of underground pipes too easily become defective owing to their resistance and elasticity being insufficient, or to their indurability to withstand the effects of settlements, shocks, expansion, or other movements.

There is, therefore, every reason to provide a joint of a really effective kind.

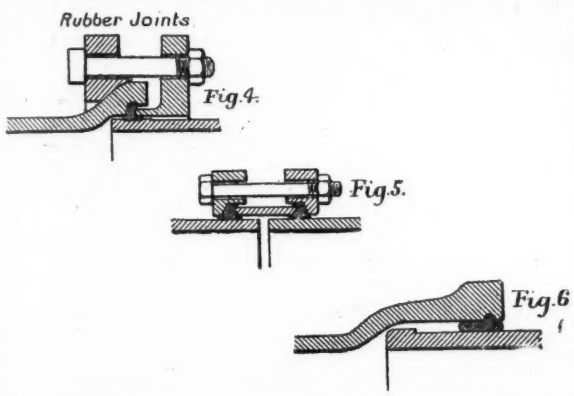
Joints of Lead or Rubber.

The ordinary methods employed for jointing pipes are next considered—firstly, lead and yarn; secondly, india rubber; thirdly, a combination of the two. Three types, German, English, and French, of the usual spigot-and-socket lead joint are shown in figs. 1, 2, and 3. They are unable indefinitely to resist the forces



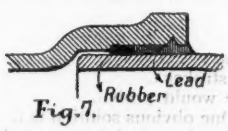
to which they may be subjected without becoming to some extent disunited. The least strain tends to cause a slight sliding or slipping of one of the two pipes. Constant repetition of this, sometimes in one direction and sometimes in another, often finishes by rolling out the lead or else by cutting off the cast-iron at its weakest point.

The movement or displacement of pipes takes place still more easily with india-rubber joints, whether with or without tightening bolts, as shown in figs. 4, 5, and 6. In these systems the rubber is not squeezed into the joint, but simply carried along on the spigot by reason of the pressure against the socket. There is nothing to prevent perpendicular, parallel, or oblique forces from producing leakage by cutting or pulling, or twisting the rubber.



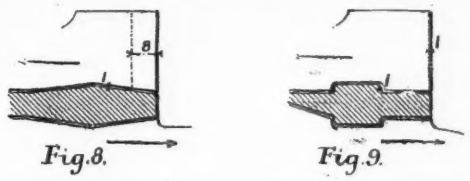
Leakage can thus occur at the same time in the two rubber rings of fig. 5. Neither can the closely fitting joint of fig. 6 keep its tightness long. When the pipes are rough-cast from the foundry, the play is always sufficient to allow of displacements which the elasticity of the rubber cannot follow without allowing fissures to appear. If the pipes are turned and bored, alternative movements often dislocate them sufficiently to cause the same inconvenience. They also necessitate having special pieces for the slightest change in direction; and as they do not always allow for the necessary play in the movements of the pipes, the sockets are strained—resulting sometimes in breaking the sockets or else lifting the pipes.

In the socket systems, it sometimes happens that the rubber, placed more or less regularly, or twisted at the moment of making the joint, dislocates the pipes after their entrenchment. On the other hand, in the bolted systems, the rubber being too tightly squeezed, does not remain tight, or the flanged-pieces become weakened or break under the pull of the bolts either during or after laying. The bolts soon become rusted, especially in acid or



wet subsoils, when they cannot be dismounted without breakages occurring. After 15, 20, or 25 years, the bolts or rubber of some joints will require renewing, which means additional expense which should be taken into account. The flexibility of these joints is, therefore, only obtained at the cost of the duration of their tightness, and such sacrifice is not to be entertained where pipes are put in the ground and are difficult to inspect.

The next series of joints examined are those in which the rubber is compressed and held in position by lead. The joint shown in fig. 7 has the rubber squeezed by the lead which is caulked and anchored by the notch in the socket, as indicated. Nevertheless, it allows of slippings on the part of the male pipe end and thus produces similar cracks in the joint to those already mentioned in regard to wholly lead joints. Fig. 8 shows the lead



in the form of a double cone swelling, while in fig. 9 it is in the shape of an expanded square, penetrating into both the spigot and the socket. It offers, therefore, the least space for longitudinal variations, and is capable of following the movements of an elastic joint, while being conveniently fastened so as to avoid the defects of other methods of fastening previously mentioned.

M. Gilbert remarks that a slight swelling or expansion will not be sufficient in all cases; and he proceeds to establish, by calculation, what are the requisites for the safety of a joint. His conclusion is that an expansion of 15 millimetres is required to withstand ordinary slipping. It could be strengthened by increasing the section or by using material more resisting than pure lead.

Futility of Ordinary Testing.

He comments on the present day necessity of redoubling precautions owing to vibration and shocks caused by heavy motor vehicular traffic; and he quotes from Mr. Foulger's evidence on the subject before the Royal Commission, comparing the 87 instances of broken gas-pipes of the year 1899 with the 800 cases of 1905. Moreover, there is the constant danger of damage to gas-mains arising from electrolytic action—such as has taken place at Alexandria, Pittsfield, Zurich, Pittsburg, and many other towns. In short, leakages soon occur; and they increase in number and importance with the age of the mains, and with the frequency and intensity of the operative forces. The repair of leakages is only a costly palliation of the evil. The testing at a more or less high pressure, after the placing of the main, is not enough to assure the continued tightness of its joints, as ordinarily the precautions taken to have a successful test are not the conditions that exist in actual work. If the tests were made by means of a hydraulic press, and blows from a ram were struck on to a line of pipe placed freely on the ground, there would be a test in some degree comparable to that actually existing in a main after it has been laid for some time; and it would be seen at once that the ordinary types of joints could not remain tight under the earth for any length of time.

M. Gilbert's Patent Joint.

The close examination of the types of joints used for gas and water mains shows that too great elasticity is expected from the lead, while at the same time its resistance is imperfectly utilized; also, greater elasticity and resistance are demanded from the rubber than it has. The author, considering that these materials could be turned to better account for gas and water pipe joints, designed the method of jointing shown in fig. 10, which combines the elasticity of rubber with the resistance and inoxidibility of lead.

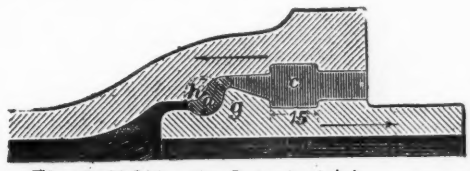


Fig.10. M.Gilbert's Patent Joint.

In his system, the joint is formed of a rubber ring which is powerfully compressed at the moment of placing the pipes in position, and is so maintained by a rim of lead run in ordinarily at the pipe ends. The rubber ring *a*, the original form of which is round, is placed in a groove at the end of the spigot. It is compressed as far as possible in its fixed position by two rounded shoulders *g h*. The form given to the parts of the pipes which hold the rubber ring prevents it from rolling and being cut or torn during the erection. Also, the outside parts of the rubber can protect the middle which is the most compressed and the most efficacious. The lead filling is kept in position by two recesses placed one in front of the other—one on the spigot and the other on the socket, and forming a key *c*, the shoulders of which offer the maximum resistance to the longitudinal slipping of the pipes. The lead key allows the necessary play for movement, and protects the rubber from contact with the air or soil. It also ensures the metal continuity of the line of pipe, and thus reduces the dangers of decomposition by electrolysis. In water-mains, the rubber prevents the water from coming in contact with the lead. The durable jointing effected by the lead grooves limits the movements of the pipes to the displacements that the elasticity of the

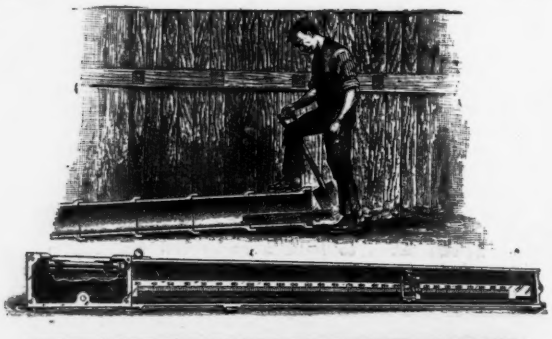
rubber can follow without permitting cracks or fissures. The system has been applied to ordinary cast-iron pipes, as well as to those in steel. The price per metre-run is about the same as that for ordinary spigot and socket pipes, by reason of the weight being slightly less, as the sockets are not so long. The laying of pipes on this system is more rapid and is not more costly than with other systems.

The old type of joint leads to leakage and breakage, and there is every reason—both from a financial and a sanitary point of view—to adopt something better, which the system described is claimed to be.

THE GRADING OF GAS-MAINS.

The "Gradiograph."

Our readers are aware that in the laying of gas-mains a point that requires special attention is the placing of them at the proper gradient to allow the products of condensation to flow into the catch-boxes. It may be useful, therefore, to bring under their notice an instrument by which, it is claimed, both economy of time and increased accuracy may be secured in connection with this operation. Some of them may possibly remember that among the exhibits in the Mathematical and Scientific Instruments Section of the Franco-British Exhibition were to be seen samples of the drawing and surveying instruments made by Messrs. A. G. Thornton, Limited, of Manchester, for which they were awarded a gold medal and a diploma of honour. The firm have designed an instrument which has been found specially suitable for railroad construction, sewering, and road making, but is equally adapted



The "Gradiograph" in Use for Laying Mains.

for any purpose where it is necessary to work to a given gradient or ascertain the correct inclination of any existing gradient. The instrument is called the "Gradiograph," and it is shown in the accompanying illustrations. It consists of an elongated metal casing of rectangular section made of nickel aluminium. An accurately graduated steelyard is pivoted towards one end of the casing at a point that coincides with zero, and is marked in units and half units from 30 to 305. Above the pivot, and attached to the steelyard, is mounted a sensitive bubble, which is graduated and accurately ground. It is similar to those put in all civil engineering instruments such as levels, theodolites, &c. Travelling along the steelyard is a cursor or traveller so graduated as to make it possible of adjustment to any intermediate gradient, such as 1 in 98·7 or 1 in 296·8. At the extreme end of the steelyard is provided a notch or recess; and when the cursor is placed in this position, the instrument is converted into a very accurate level. As before mentioned, it has a range of gradients from 1 in 30 to 1 in 305; but, if desired, the graduations on the steelyard can be arranged to give different gradients.

One of the illustrations shows clearly how the instrument is used. The bottom of the cutting is formed by means of the "Gradiograph" attached to a straight-edge. When the pipe layer is getting out his socket holes, he leaves them slightly high; he then places the instrument on the invert of the pipe, leaving the bubbles in view. Now he strikes the pipe with his foot until the large bubble appears in the centre of its run; and when this is done, the pipe is at its perfect gradient. Suppose, for instance, the pipe shown in section is one of many that are being laid to 1 in 300. The "Gradiograph" can be set and fixed by means of the cursor and set-screws to 1 in 300 before leaving the office if desired; the duty of the man laying the pipes being solely to set his instrument in them as shown—the feet at the same time resting firmly on the inside surface of the two pipes.

The "Gradiograph" can be employed for the laying of any length of pipes. It is provided with case-hardened steel feet for laying pipes 2 feet and 2 ft. 6 in. long; but if longer pipes are being used, it can readily be attached by means of the lugs at either end to any length of a straight-edge, and by the same means the cutting can be excavated to the exact gradient required for the pipes. Its overall measurements are 36 in. by 3 in., and 1 inch thick; and its total weight ready for use is 7 lbs.

Poisoning by Carbon Monoxide.

At an ordinary general meeting of the South Staffordshire and Warwickshire Institute of Mining Engineers held recently in Birmingham, a paper was submitted by Drs. J. S. Haldane and C. Gordon Douglas, on "Testing for Carbon Monoxide in Connection with Fires and Explosions in Mines." Before the close of the proceedings, the audience were invited to ask questions; and, in response, the following were put and answered: (Q.) Supposing the blood of a person to be half saturated with carbon monoxide, how long would it take for that person to reach a normal condition?—(A.) Very difficult to say, as the after-effects upon persons vary; in some it takes considerably longer than others to reach a normal state. (Q.) How long would it take for a person to become affected in a percentage of 0·2?—(A.) The person would be safe for an hour if in a state of rest; but if working, half-an-hour. On a miner becoming affected, it is very necessary for him to leave the place as quietly as possible, as anything in the nature of hurry and over-exertion would be fatal. (Q.) What is the lowest percentage of carbon monoxide that can be detected?—(A.) 0·01 per cent. (Q.) What are the after-effects of carbon monoxide poisoning in a pure mixture of air and the gas?—(A.) Throbbing headache and weakness, though some people are not affected that way.

Recent Wills.—Sir John Baker, the Chairman of the Portsea Island Gas Company and of the Woking Water and Gas Company, whose death was recorded in the "Journal" for the 16th ult., left estate of the gross value of £148,792. Mr. Charles Alfred Teuten, a member of the Corporation of London, whose name, as Chairman of the Streets Committee, came prominently before our readers a few months ago in connection with the deputation to the Continent to inspect the street lighting, left estate of the gross value of £25,756, with net personalty £3347. Mr. Matthew Leaf, formerly Secretary and Manager, and of late years a Director, of the York United Gas Company, whose death on the 8th of October was noticed in the "Journal" at the time, left estate of the total value of £10,640. Mr. Francis Hastings Medhurst, of Victoria Street, S.W., who died on Oct. 26, at Croydon, as announced in the "Journal" at the time, by his will, dated June 20, 1905, left £35,000 upon trust for a fund to be designated "The Emigrants' Colonization Trust Fund," to promote emigration to the British Colonies for deserving artizans. The testator appears to have assumed that he would have the disposition of considerably more than £100,000; but his estate is valued for probate at £3038 gross, with net personalty *nil*.

The Gas-Engine of the Future.—The Engineering Supplement to "The Times" for the 15th inst. contained an article by an engineering correspondent on "The Present Position of the Gas-Engine." Having fully considered this subject, he took a brief glance into the future, and said: "What is really needed is an engine with a long expansion stroke, so that the gas is not liberated to the exhaust until it is far nearer atmospheric pressure than is now customary. With present-day engines, the larger proportion of the heat energy in the fuel goes to the exhaust. The lengths of the other strokes are of nothing like such importance; but an ideal engine would probably have all its four strokes of different lengths. One obvious solution is to use the exhaust gas in a second cylinder and so work 'compounded.' Another solution is the one lately suggested in Mr. Humphrey's ingenious gas-pump, where use is made of a column of water to act as piston, as connecting-rod, and as fly-wheel. In this engine all four strokes are of different lengths; and during the explosion stroke the gases expand to atmospheric pressure. The machine is, however, quite a new one, and no one can tell how it will turn out; but its promise is undeniably great, despite the apparent incongruity of bringing cold water and white-hot gases into close contact."

REGISTER OF PATENTS.

Producing Hydrogen.

CLARK, G. M.; a communication from the DELLWIK-FLEISCHER WASSERGAS, G. m. b. H., of Frankfort-on-Main.

No. 21,479; Oct. 10, 1908. No. 7849; April 1, 1909.

These applications were combined, under section 16 of the Patent Act of 1907; and a complete specification was filed on Sept. 30 last.

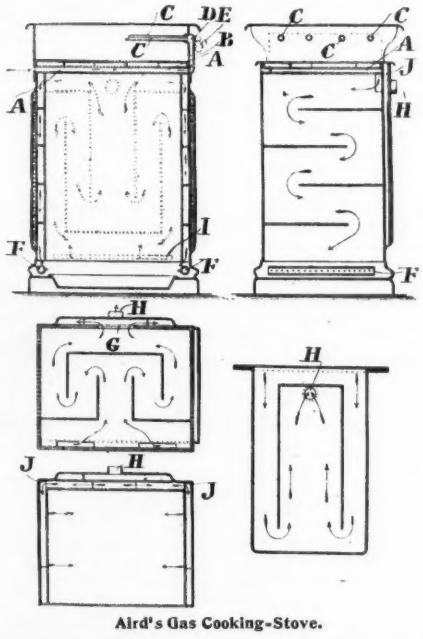
The claims made indicate the general trend of the inventions. They are: 1. The employment, in the production of hydrogen by the alternate reduction of ferric oxide by means of reducing gas and re-oxidation by means of steam, of an oxide-iron ore in a fragmentary state for the production of the spongy iron or spongy iron oxide. 2. The employment of ferric oxide obtained in a fragmentary state from iron sulphide ores (pyrites) for the production of the spongy iron. 3. The employment, in combination with the reducing gas, of a volume of steam not exceeding one-half of the combined volumes of the carbon monoxide and the hydrocarbons contained in the reducing gas. 4. Arresting the reduction when the oxide is only partly—*i.e.*, not more than half-reduced, for the purpose of preventing the deposition of carbon. 5. The reduction of an oxide-iron ore in fragments, or an iron oxide obtained from silicious iron sulphide ores (pyrites), by means of a mixture of reducing gases and steam—the volume of the steam not exceeding one-half of the combined volumes of the carbon monoxide and hydrocarbons contained in the reducing gases—the reduction being carried out until not more than one-half of the oxide is reduced, and alternately with the oxidation by steam of the iron sponge produced in the reduction phase of the process.

Gas Cooking-Stoves.

AIRD, K. (R. & A. Main, Limited), of Queen Victoria Street, E.C.

No. 2005; Jan. 27, 1909.

This invention relates to gas cooking-stoves which have the oven surrounded by chambers provided with baffle-plates and through some of which chambers the air to support combustion at the burners in the oven travels in a circuitous manner and gets highly heated by the heat in the oven before reaching the burners. The object of the inventor is to heat the air employed for mixing with the gas supplying the burners positioned above and outside the oven, "so that a greater heat is obtained at those gas-burners than when the air for mixing with the gas in the mixing-chamber is taken from the atmosphere and used in a cold state."



Aird's Gas Cooking-Stove.

Above the oven is a chamber A, leading from one side of the stove to pipes B (at the other side) carrying the top gas-rings C and also the spits or nozzles D leading from the taps E and gas supply-pipe F. The illustrations show a gas-stove so constructed that the chamber A can be heated on both sides.

For taking the air supply to the burners over the crown of the cooker, there is interposed a plate between the upper and under crowns of the cooker, and thus a hot-air chamber A is formed, which becomes heated both top and bottom; the air being preferably taken from outside. Baffle-plates are fixed in the chamber A between the under and middle crowns in any position found requisite, so as to ensure sufficient travel for the air to become thoroughly heated before reaching the mixing-chambers of the top burners.

The waste gases or products of combustion from the oven-burners are utilized by passing them through holes in the front of the cooker and between the upper and middle crown-plate S in a circuitous manner by means of baffles; and the waste gases are caused to travel out of the hole G and down and up the back of the cooker in a circuitous manner, by means of the baffles, before reaching the flue outlet.

The back, sides, and top of the stove have two or more walls to form passages provided with baffles, and with entrances and exits to suit.

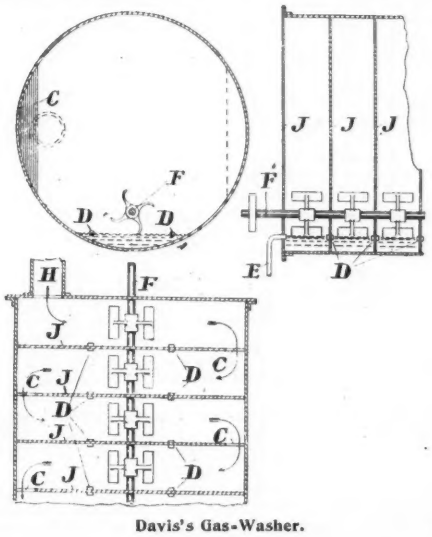
The air supply to the oven-burners is heated by taking it in at a hole I in the bottom of the back-plate and causing it to travel, by suitable channels, between baffles to the top of the back-plate and across to, and through, holes J down the sides of the cooker to the oven-burners with a circuitous travel by means of baffles.

Gas-Washers.

DAVIS, G. K., of Manchester.

No. 2113; Jan. 28, 1909.

In the process of purifying coal gas (or freeing blast-furnace gas from dust), the patentee points out, it is necessary to bring the gas into intimate contact with the washing liquor whatever this may be; and various devices are at present in use for carrying out this operation—the devices being based upon different principles. For example, the intimate contact between the gas to be washed and the washing liquor is in some cases effected by passing the gas through a chamber provided with partitions, so as to cause it to pursue a vertical, tortuous, or zigzag path, during which it meets with a spray of the washing liquor, produced (for example) by revolving blades or fanners extending transversely across the chamber and which, during their rotation, dip into a layer of the washing liquor at the bottom of the chamber and so spray it through the chamber.



Davis's Gas-Washer.

The apparatus forming the subject of this invention is of this type, and comprises a cylindrical shell of suitable dimensions for dealing with the required quantity of gas, and of a length depending upon the character of the washing operation. The shell is fixed with the axis of the cylinder in a horizontal position; and it is divided into chambers by partitions fixed at right angles to the axis. Apertures are made in the partitions, so as to cause the gas to follow a horizontal zigzag course through the washer; and openings are also made in the partitions whereby the liquor is caused to travel through the washer in the required direction—the depth of the liquor being made suitable for each individual set of conditions. Parallel to the axis of the cylinder is fitted a shaft, upon which are fixed the fanners for producing the spray; one or more fanners being placed in each of the chambers.

The casing of the washer shown is cylindrical. A series of transverse chambers are formed by the vertical partitions J, each provided with an opening C at one end; the apertures in the alternate partitions being at opposite ends, so as to cause the gas which traverses the chambers to pursue a zigzag path. The inlet pipe for the gas, H, is fitted to one end of the chamber; the outlet being at the other end (not shown). The bottom of the chamber contains a quantity of the washing liquor; and in order to permit this liquor to travel throughout the washer and remain at the same level in all the chambers, each partition J is provided with apertures D, the height of which is adjusted to the height to which the level of the liquor is to be maintained in the washer. The liquor is withdrawn from the apparatus, when required, through the pipe E. The shaft F extends longitudinally through the casing parallel to the axis thereof; G being the fanners keyed on the shaft. They are so arranged relatively to the liquor in the bottom of the casing that the tips of their blades dip slightly below the surface, whereby, when the shaft is revolved, the blades catch a portion of the liquor and throw it up in the form of spray.

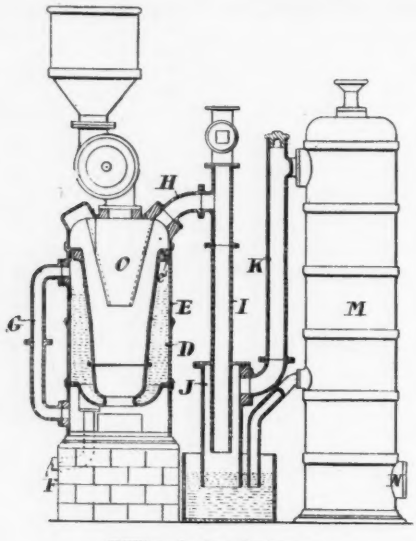
Gas-Producers.

WILLIAMS, H. W., of Abertillery, Mon.

No. 9901; April 26, 1909.

The primary object of this invention is to provide an easily transported and erected gas-producer of the type in which the combustion chamber is surrounded by a water-jacket, by building it up of interfitting metal sections, whereby a worn-out or otherwise damaged section is adapted to be replaced by a similar section with facility. A further object is the provision of means for utilizing the heat of the exhaust gases from a gas-engine by the producer, to assist in heating the vaporizer.

The producer has its upper end closed and fitted with a hopper,



Williams's Gas-Producer.

which supplies fuel in measured quantities by means of a rotary device, which also prevents entry of air and exit of gas through the hopper. Surrounding the entire fuel space of the producer is a water-jacket D, consisting of the annular space enclosed between the conical metal wall of the combustion chamber and the outer wall E. At the lower end of the combustion chamber, a constricted neck is provided for retaining the fuel; the neck constituting the bottom of the water-jacket. F is the feed-pipe for supplying water to the water-jacket, in which the water is maintained at a constant level by a float valve or other contrivance.

The steam generated in the water-jacket is conducted by a pipe G leading from the upper portion to an enclosed space beneath the open bottom of the combustion chamber, from which (mixed with air admitted in a regulated manner) it will rise through the incandescent fuel contained within the producer and be dissociated into its constituent elements, and enter into combination with the carbon of the fuel.

From the upper portion of the producer, the generated gas is conducted by the pipe H and down-take I to a tar-trap J, whence, by means of a pipe K, it is conducted to the purifier or washer M, constructed as described in patent No. 572 of 1908. The purified gas leaves the purifier by the pipe N.

To prevent the burning fuel from making contact with the upper portion of the combustion chamber where the latter is not surrounded by water, the fuel is introduced from the hopper through a funnel O, the lower end of which is situated beneath the level of the water in the surrounding jacket.

The apparatus is constructed in sections, to facilitate renewal; the exterior wall E of the jacket being composed of a plurality of superposed annular sections provided with flanged bosses, where required, for connection to the steam and other pipes. In the modification adapted for utilizing the heat of exhaust gases from a gas-engine, the outer wall of the water-jacket D is surrounded by a casing of larger diameter; and in the annular space so enclosed the exhaust gases from the engine served by the producer are adapted to circulate and assist in heating the water contained in the water-jacket.

Controlling Gas-Burners from a Distance.

RENKEWITZ, E., of Berlin.

No. 12,314; May 25, 1909. Date claimed under International Convention, May 27, 1908.

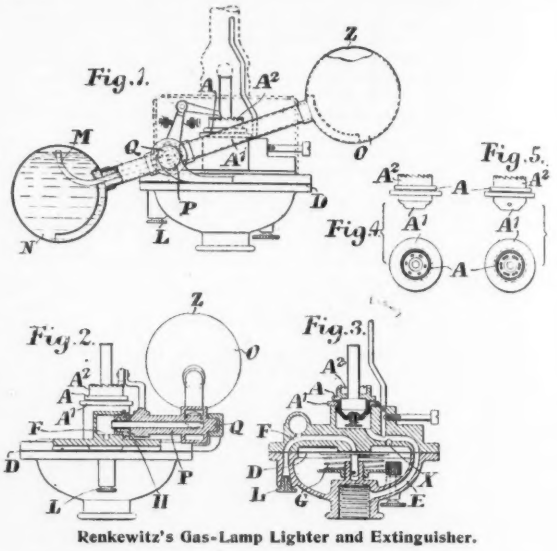
This invention has particular reference to apparatus by which street-lamps are turned on and off by a difference of pressure, rendered operative by two pivotally supported communicating liquid vessels or tanks, one of which is connected to the gas supply, while the other is exposed to the atmosphere.

In the construction shown (applicable to vertical burners), the casing is divided by a diaphragm D into two chambers. A conduit E, passing through the two parts, supplies gas to the distributing drum A; and from it branches off a perforation X (fig. 3) establishing communication between E and the chamber above the diaphragm. The distributing drum A, forming the gas-closing valve and acting like a rotary slide valve, consists of a plug A^1, with a gas-tight drum ground into it, and provided with a toothed rim A^2, as well as with the gas-nozzle of the burner. The teeth of the toothed rim correspond to the perforations and to the intermediate spaces of the distributing drum between the perforations, and, on the drum being rotated, the openings of the member A^1 are opened or closed in the well-known manner.

The distributing drum A, shown in fig. 4, is intended for evening lamps, which can be extinguished by a pressure shock in the gas-pipe; the solid portions situated between the openings of the drum closing the gas supply openings of the insertion part A^1 on the drum making a partial rotation. The distributing drum shown in fig. 5 is, on the contrary, intended for night lamps, and is provided with gas-passage openings arranged in couples side by side; so that two pressure shocks in the gas-pipe are required to extinguish the lights.

The diaphragm D is pressed by an adjustable spring against the bottom of the casing; and thus closes a second conduit F, which, on the one hand, is connected through a stuffing box H to the oscillating system N O, and, on the other hand, is closed by means of a screw L provided with a fine opening. This screw is preferably filled with porous material (say, cotton wool), to prevent it from getting choked with dust, &c.

The communicating vessels consist of two hollow balls N and O connected by pipes and intended to receive a liquid. They form, with the hollow tipping spindle P, a rigid system, rotatably mounted with its hollow spindle in the stuffing-box H and about the pin Q. Its travel is limited by an arm playing between stops. The perforation of the spindle P is in close proximity to a pipe M carried to a point beyond the highest level of the liquid in the vessel N. In this way, the pipe M establishes communication between the vessel and the conduit F; while the vessel O is in communication with the atmosphere through the opening Z. The arm mounted on the spindle P carries a pawl, the edge of which engages with the toothed rim A^2 of the distributing drum A.



Renkewitz's Gas-Lamp Lighter and Extinguisher.

In figs. 1 to 3, the distributing drum A is shown in its closed position. The working is then as follows: The gas, arriving at the ordinary pressure, passes through a branch of the conduit E to the constantly burning bye-pass flame; while the chamber in the upper part of the casing, which is also connected to the conduit by the perforation X, is closed by the diaphragm. In case of a temporary increase of pressure to the extent of (say) 10 mm. above the normal level, the diaphragm D will be forced back in opposition to the action of the spring G, so that the conduit F will be connected to the conduit E—that is to say, to the gas-supply pipe. The gas will pass then through the perforation of the spindle P and the pipe M, press on the liquid in the vessel N, and force it into the vessel O; the air from the latter escaping through the opening Z. The small quantity of gas escaping through the hollow screw L during the period of super-pressure does not affect the process in question. The weight of the liquid forced by the super-pressure into the vessel O brings about a rocking movement of the communicating system N O. The distributing drum is thus turned further to the extent of one tooth, and the gas can pass through the perforations of the drum A to the burner. On the pressure sinking to the normal level, the spring G will again press the diaphragm D against the mouth of the conduit F and close it. Owing to the slow escape of the gas contained in the interior of the ball N, through the perforation of the screw L, the liquid will return to the vessel N, and the system N O will be again brought into its original position.

Charging Gas-Retorts, Coking-Ovens, &c.

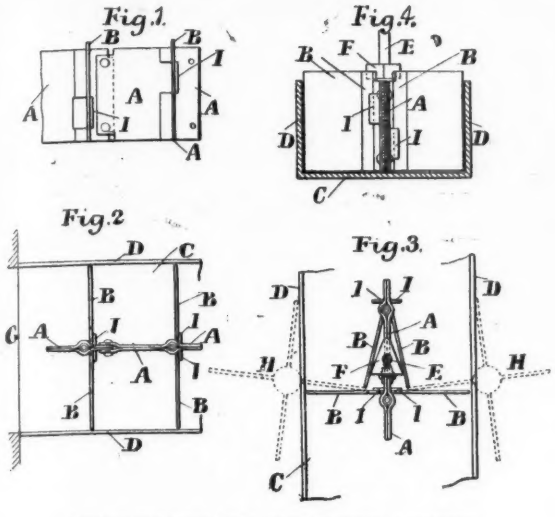
MASTERS, E., of Palace Chambers, Westminster, and HANSFORD, J., of New Barnet.

No. 14,411; June 19, 1909.

This invention relates to a combined "charging and spreading member," comprising a "pull-and-push" or reciprocating bar or frame provided with a number of laterally disposed and vertically hinged or pivoted wings or push-plates, which, as the member travels forward and approaches the mouth of the retort, are moved from a position in which they lie folded towards, and along, the sides of the bar to an extended position transverse of the bar; so that with a further forward movement they push the coal that has been deposited between them from off the charging platform through the mouth and along the floor of the retort, and (as the member is withdrawn) return to the folded position and spread laterally, to a greater or less extent, the coal that has been deposited in the retort.

Fig. 1 is a side elevation of the device showing the push-plates or wings in an extended position, transversely of the reciprocating bar, for pushing the coal along the bottom of the retort. Fig. 2 is a plan with the wings extended laterally just outside the retort ready for the charge of coal. Fig. 3 shows the wings in the position they assume as the charging member is drawn backwardly through the retort, and in which they are folded back towards the sides of the bar. Fig. 4 is a cross section of the device and of a charging platform co-operating with it.

The reciprocating bar or frame consists of a number of plates or sections A suitably pivoted to each other so that the bar may assume a curve in a vertical plane should one end of it be elevated. If, however, the bar is to be guided on a horizontal plane, the pivoting is unnecessary. It would then consist of a single plate of requisite length. At suitable distances apart on both sides of the bar are pivoted or hinged to it wings B, arranged either in pairs opposite one another on either side of the bar or otherwise. The bar is carried on the frame of a charging



Masters and Hansford's Retort Charger-Discharger.

apparatus, and any known means may be provided for pushing it into, and withdrawing it from, the retort.

The frame carries the usual charging platform C, provided with sides D to form a trough, and which register with a mouthpiece of the retort G.

Means are provided for moving the wings B from the normal position when folding back along the sides of the bar to the extended position shown in fig. 2, previous to passing below the charging shoot. These means may consist of a bar or lever E, adjustably mounted on the charging frame so that the operator may raise and lower it at will. This bar carries at its lower end a wedge-shaped member F, which, when the bar is shifted to its lowest position, will be in the path of the wings as they travel forward. As the wings contact with the members F, they will be opened out to any desired extent. The wings have a notch at their inner top edge to allow them to clear and pass the wedge F when it has moved them into the open or extended position.

As the charging member with extended wings passes over the platform, coal is shot through the shoot into the pockets formed by the wings and the sides and bottom of the platform, and is caused to travel forward through the mouth and over the floor of the retort. The extended wings feed the coal into the retort by pushing the charges in front of them. As soon as the charging member has travelled forward the requisite distance within the retort, the bar E is lifted so that the member F will be removed from the path of the wings, which, as the charging member is drawn backwards, will fold towards and along the sides of the reciprocating bar owing to the resistance of the deposited coal behind them, and so remain until (during a succeeding operation) they again contact with the member F, which has been replaced in their path. As the charging member is withdrawn, the folded wings tend to spread the deposited coal.

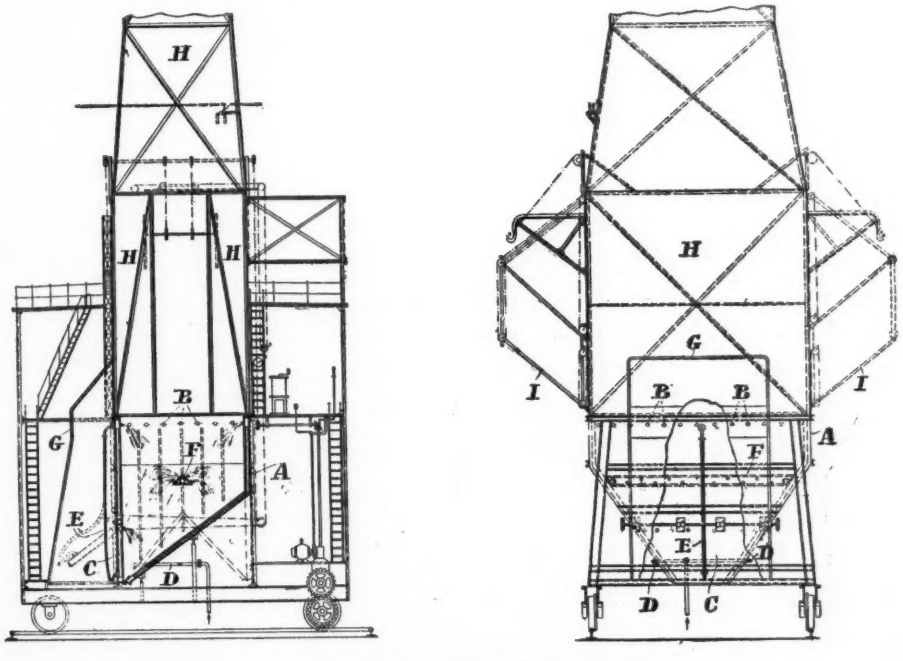
Quenching Incandescent Coke.

KRAUSE, E. H. H., of Hamburg.

No. 15,052; June 28, 1909.

This invention is particularly adapted for dealing with coke in large quantities—in retorts working with large charges—in the trough of a traveller movable on rails in front of the retorts. In such case the walls of the quenching trough are apt to be damaged by excessive heat; and it has already been suggested to make the lateral walls of the trough hollow and to cool them by water circulation—the upper walls having previously been in the form of a hood above the trough and provided with a longitudinal slot through which water contained therein could flow on to the coke in the trough. According to this invention, however, the water-jacketed quenching trough is of special construction, and one or more water-containing transverse beams are provided within the trough having openings from which the core of the coke in the trough is sprayed "so as to ensure the most thorough and rapid quenching thereof."

In the construction illustrated, the quenching trough A is mounted in the centre of the movable traveller in front of the retorts. The lateral walls, as well as the bottom of the trough, are formed double, and adapted to have water circulated through them for cooling purposes. The lateral walls are stiffened inside by ribs, which, however,



Krause's Coke Quencher.

are of such construction that the water used for cooling the walls can freely flow through the hollow space of the walls. The trough is open at top, and openings B are formed in the upper portions of the side walls through which cooling water can pass into the interior. The wall on the left-hand side in the section is provided at its lower end with a rotatable discharge door C, which also has double walls and can be opened or closed at will from the central platform of the traveller by means of a sprocket and chain gear so as to empty the contents of the trough. Water is supplied to the walls and the bottom of the trough through a pipe D leading into the walls of the trough; while the hollow door C is supplied with water by means of a flexible pipe E connected to the upper portion of the corresponding lateral wall. The door is provided near its upper end with openings whereby the coke in the lower portion of the trough, or falling from it, is sprinkled with water.

There is provided in the interior of the trough a single hollow cross-beam F, to which water is supplied through pipes from the hollow lateral walls; this water passing through lateral openings in the beam to the heart of the mass of coke in the trough. The beam is at the same time utilized as a baffle, since it divides the coke falling on it from the retort into the trough, and thus assists its quenching. In front of the lateral wall of the trough which has the discharge door, a partition G is provided at the required distance forming an exhaust passage for the steam or fumes, the upper portion of which opens into the usual central tower-like chimney H of the apparatus, through which steam generated during the extinction of the coke is carried upwards; "thus protecting the attendants from danger."

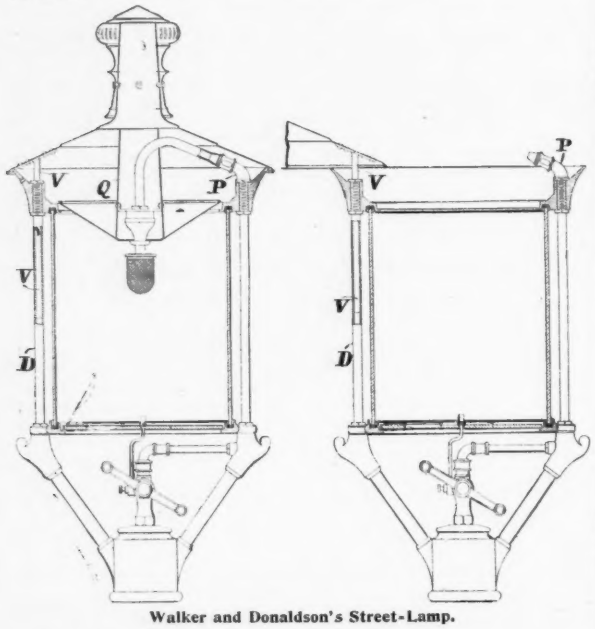
The transfer of coke from the retorts to the quenching trough is effected by means of shoots I arranged at one or both sides of the traveller and opening into the trough. In operation, the coke as discharged will be quenched all over its upper surface by water from the openings B in the lateral walls; its central portion or core being simultaneously subjected to the action of the water from the openings in the cross-beam F, and its lower portion by the water escaping through the openings in the water-cooled door C. Owing to the coke being simultaneously extinguished throughout, "quenching takes place in a rapid and thorough manner;" on the other hand, "owing to the cooling of all the walls, as well as of the bottom and discharge door of the trough, the latter is not excessively heated by the incandescent coke, and is not therefore damaged."

Street Gas-Lamps.

WALKER, A. B., and DONALDSON, J. H., of Wallsend.

No. 11,257; May 12, 1909.

This invention relates to gas-lamps with domes or covers adapted to be raised.



Walker and Donaldson's Street-Lamp.

The lantern is provided with a dome or top which rests on the top ring, and with a flat transparent base supported by the bottom ring. The dome is furnished with a rod or shank V adapted to depend into the pillar D to form a pivot whereby, when the dome is raised to clear the flue Q, it can be turned to one side (as shown) to give access to the interior of the lantern. The burner, flue, and reflector can then be removed in one piece by disconnecting the burner-pipe from the union P. The bye-pass pipe for the burner passes through the base of the lantern. It may be of the ordinary arrangement, or it may be of the expanding flame type and be lighted by a torch inserted into the lantern through an opening in the base normally closed by a hinged flap.

APPLICATIONS FOR LETTERS PATENT.

29,075.—PROCKTER, F. M., "Joining pipes and tubes. Dec. 13.

29,093.—PARKINSON AND W. & B. COWAN, LTD., and CHESHIRE, W., "Street lamps." Dec. 13.

29,125.—JOHNSON, J. Y., "Making gas by the dry distillation of coal and the like for preventing the formation of thick tar." A communication from Maschinen and Armaurenfabrik vorm. H. Bruer and Co. Dec. 13.

29,145.—WALLER, E. W., "Inverted burners." Dec. 13.

29,148.—DEKKER, A., "Gas-engines." Dec. 14.

29,149.—RADCLIFFE, J., "Purification of condensation products from producer-gas manufacture." Dec. 14.

29,162.—NEWHOUSE, W. A., "Incandescent burners." Dec. 14.

29,166.—WHITEFIELD, F. M. & R. H., "Gas blow-pipes." Dec. 14.

29,199.—RUSCOE, J., AND CO., LTD., and KENYON, G. H., JUN., "Connecting branch service-pipes with mains." Dec. 14.

29,225.—STEVENS, J. H., JONES, H. A., and PUDNEY, F., "Inverted burners and mantles." Dec. 14.

29,220.—WATTS, C. J., and BROWN, E. W., "Gas-heated radiators." Dec. 14.

29,264.—COURT, E. J., "Mantle support." Dec. 14.

29,313.—SMITH, A. H., and SHAW, F. G., "Vertical retorts." Dec. 15.

29,328.—RUTHENBURG, M., "Distillation of coal." Dec. 15.

29,358.—CHURCHWARD, S. F. C., "Connecting pipes." Dec. 15.

29,389.—ELLIOT, E., and HAWES, A. J., "Gas-economizer." Dec. 15.

29,426.—MEYNELL AND SONS, LTD., and MEYNELL, H., "Gas-brackets." Dec. 16.

29,452.—KOST, K. F. M., "Inverted burners." Dec. 16.

29,502.—SOCIETE DU GAZ DE PARIS, "Automatically controlling luminous signs." Dec. 16.

29,536.—CRUICKSHANKS, W., and GOURLAY, J., "Making gas from petrol or gasoline." Dec. 17.

29,552.—KENNEDY-M'GREGOR, J. A., "Gas-meter." Dec. 17.

29,568.—ZIEGLER, M., "Production of gas from domestic and street refuse and sludge." Dec. 17.

29,606.—RUPPERT, H., "Gas-burners." Dec. 17.

29,607.—PEREGRINE, S. W., "Carburetting air." Dec. 17.

29,611.—CALVERT, G., "Gas-stove." Dec. 17.

29,624.—STILL, E. H., and STILL, W. M., AND SONS, LTD., "Gas-lamps." Dec. 17.

29,625.—STILL, E. H., and STILL, W. M., AND SONS, LTD., "Gas-burners." Dec. 17.

29,628.—AINLEY, L., "Padlock protector for prepayment gas-meter money-box." Dec. 17.

29,636.—FEATHER, R., "Fastenings for the doors of gas-ovens." Dec. 18.

29,650.—SUSSMANN, H., "Incandescent burner." Dec. 18.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Coulson's Tar Patent.

SIR,—I am at a loss to understand the value of adding sulphuric acid to the pitch in the still, as explained by Mr. Coulson in his patent, No. 7427 of 1909 (see "JOURNAL," Dec. 14, p. 757). What does it do to increase the value, and who buys the product? Will some of your readers or Mr. Coulson help?

IGNORAMUS.

Dec. 20, 1909.

The Catastrophe at the Hamburg Gas-Works.

SIR,—I am obliged to Mr. Whimster for pointing out the slip I made in my letter last week, when contrasting the size of the Hamburg and South Metropolitan gasholders. He is quite right. The 71 per cent. mentioned by me is obviously a clerical error. It should have been 41 per cent.

F. S. CRIPPS.

71, King William Street, E.C., Dec. 22, 1909.

LEGAL INTELLIGENCE.

THE CLAIM BY A FORMER GREENOCK GAS MANAGER.

On Tuesday and Wednesday of last week, Counsel were heard by Lord MACKENZIE in the Court of Session upon the evidence recently led (see "JOURNAL" for Nov. 23, p. 548) in the action by Mr. W. Ewing against the Corporation of Greenock. The pursuer sues for £1645 8s. as due to him for services rendered outside his duties as Gas Manager.

Mr. J. B. YOUNG, for the pursuer, contended that Mr. Ewing was appointed Manager only, as was shown by the minutes, and that the engineering duties which were laid upon him after his appointment were not in contemplation when he was appointed. There was no evidence in the minutes that the pursuer exceeded the instructions given him by the Committee. Counsel went over the evidence in detail, and urged that the effect of it generally was that his client was called upon to do work which was not managerial work, and that he was entitled to remuneration for this work. If it were established that the work was outside the duties of the office, the onus would be upon defenders to show why pursuer should not be remunerated.

Mr. M'LENNAN, K.C., for the defenders, submitted that the primary question in the case was whether the work which was done by the pursuer was work which fell within the scope of his appointment as Gas Manager or did not. This question admitted of only one answer, which would be in the defenders' favour—that all the work which he did fell within the scope of his employment. This answer arose whether they considered the pursuer's own understanding or the defenders' understanding of the appointment, or the general practice on the subject. The further question was whether there was any ground for the pursuer's allegation of special employment, or whether there was room for an implied contract for special remuneration, apart from any employment under special terms. The evidence clearly established that there was no special qualification for a gas engineer—it was only a question of practical knowledge and experience. The evidence also established, he submitted, that all the work done by the pursuer was done by him in his capacity as Gas Manager, and that this was within the pursuer's knowledge.

Lord MACKENZIE reserved judgment.

UNDERGROUND WATER SUPPLIES IN AMERICA.

According to "Engineering Record," underground water supplies for New Jersey cities and towns are placed in a precarious legal condition by a decision of the Court of Errors and Appeals on the 15th ult., in a suit brought by a farmer to recover damages from the city of East Orange. The plaintiff claims that the driven-well water-works of the city lying east of his property deprive him of the use of a sub-surface and surface supply that was available before the city plant was built. In the lower Court, he was awarded nominal damages; but the Court of Appeal has decided that he is entitled to a much larger amount. Under the English precedents, the plaintiff would have no remedy; for it is held that underground waters are like stone and sand, which the owner of the land is permitted to remove wherever he pleases.

Nearly fifty years ago this view was argued at great length by the New Hampshire Supreme Court, and the true judicial rule was then held to be that, the rights of each owner of water-holding land being similar, and their enjoyment of these rights being dependent upon the action of other landowners, each owner is necessarily restricted to a reasonable exercise of his own rights and of his own property, in view of the similar rights of others. From this decision of 1862 there has developed in the United States the theory of "reasonable use" of underground waters, which has been adopted by the Courts of various Western States, but has not been upheld, as a rule, in the humid sections of the country. The decision of the New Jersey Court is therefore extremely important, because it restricts a landowner using underground waters drawn from his estate to their application for agriculture, manufacturing, irrigation, or other reasonable use on his own property, but prevents the withdrawal of ground water for distribution or sale for uses not connected with any beneficial enjoyment of the land whence they are taken, if this withdrawal interferes with the rights of owners of neighbouring land to reasonable use of ground water supplies from their property.

It is self-evident, in the light of this decision in New Jersey, and

somewhat similar decisions in New York, that the details of ground water flow under various conditions of pumping, and, indeed, the whole subject of ground water supplies, are rendered more complicated technically. The engineer called upon to design a system of water-works utilizing such a source of supply has always been confronted with many uncertainties requiring very careful judgment on his part, and the judicial opinion just rendered increases these complications by making it impossible to utilize a ground water supply by any means which interferes in any way with the percolation of waters through neighbouring lands.

A Water Company and Non-Domestic Supplies.

At the Portsmouth Police Court, on Monday of last week, the Magistrates were called upon to decide whether the Portsmouth Water Company were entitled to refuse to supply local tradesmen with water for other than domestic purposes. Mr. H. Marchment, a butcher, was summoned for having, contrary to the Company's Act, used for business purposes water which was supplied by the Company for domestic purposes only. Up to December, 1908, defendant paid 2s. 6d. a quarter to the Company for water used by him in connection with his business; but during that month, the Company gave him three months' notice that the existing agreement would terminate. However, at the expiration of the time, defendant refused to comply with the Company's new requirements (that the water should be charged for by meter), but continued to use in his slaughter-house the water supplied for domestic purposes. He was warned that proceedings would be taken; and as he still continued to use the water, a summons was issued. Dr. Emanuel, for the Company, submitted that the Act commanded the Company to supply water for domestic purposes, but only empowered them to supply water for trade purposes upon the terms enjoined in the Act. If water was required for any other than domestic purposes, the person so requiring it had to make application to the Company, who could either grant or refuse the request. In either case, if the person took the water for business purposes when it was supplied for domestic purposes, that person would be liable to a fine. Mr. Blagg, for the defendant, urged that the Company were bound to supply any person who applied to them for water for other than domestic purposes. It was, he said, a most serious matter; for if the Bench upheld Dr. Emanuel, the Company could, if they desired to do so, by giving three months' notice, cut off any tradesman's supply of water. Dr. Emanuel said that this was a fact in point of law; but it was not feasible to imagine that the Company would cut off their nose to spite their face. The Bench upheld Dr. Emanuel on his point of law, and fined defendant 20s. and 8s. 6d. costs. Mr. Blagg asked the Bench to state a case. Prior to the hearing of this case, two summonses against another butcher were withdrawn. In addition, four informations against a pork butcher, with respect to two alleged similar contraventions of the Company's Act, were adjourned *sine die*.

Reinstatement of Roadways.

At Bow Street Police Court, before Mr. Curtis Bennett, last Wednesday, the Metropolitan Water Board were summoned by Mr. J. W. Bradley, the Engineer and Surveyor for the City of Westminster, for failing to comply with a notice served upon them to repair and make good a portion of the paving in Vauxhall Bridge Road, which had been damaged by the bursting of a water-pipe of which they were the owners. Mr. Morton Smith, who appeared in support of the summons, stated that since the Magistrate's decision in a case which was before him a few weeks ago, as to the repair of roadways after they had been damaged in consequence of water-pipes bursting (*ante*, p. 333), great difficulties had arisen in connection with repairs to the streets; and as an element of public danger was introduced, a serious view was taken of the matter. Proceeding, he stated that on Oct. 25 the Westminster City Council received notice from the Board that they had taken up the roadway in Vauxhall Bridge Road in order to repair a burst pipe. It was found, on inspection, that the whole of the woodwork from the kerb to the tramline had been damaged; and on Oct. 30 notice was served on the Board requiring them to do what was needful in the matter within 48 hours. The repairs ought to have been completed by the following Tuesday evening; but nothing was done until the Thursday morning. Meanwhile, the area affected had to be fenced round; only one side of the road being available for traffic. Eventually the work was partly done by the Water Board's contractors and partly by the Westminster City Council; there being a dispute as to the extent of the roadway which had been damaged in consequence of the burst. For the Water Board, Mr. Courthope-Munroe submitted that the proceedings were trivial and vexatious, and that the notice served on the Board was bad, principally because it was given by an official of the Council at a time when there was no authority to give it. Mr. Curtis Bennett, in giving his decision, said that a most unfortunate condition of affairs had arisen through the action taken by the Board, rightly or wrongly, in the case recently decided by him. Up to that time, there had been no trouble; but for some reason or another the Board wished to raise the question whether the ratepayers of the whole area within their jurisdiction should pay the cost of repairs of this kind in a particular district, or whether the cost should be defrayed by the local ratepayers. In the former dispute referred to between the Westminster City Council and the Board, he ruled that, according to law, the Board were right; but he expressed his opinion on the question of fact by giving no costs. In the present instance, the Council had, in accordance with that decision, given the Board notice to do the work within 48 hours, and nothing was done within that time. Both bodies existed for the benefit of the public; and it was the public who suffered through the road not being fit for use in consequence of the repairs not having been effected within a reasonable time. The defendants would have to pay a fine of £10 and 25 guineas costs. Replying to Counsel, the Magistrate said he would state a case.

The Directors of the Coatbridge Gas Company have resolved to reduce the price of gas after Jan. 1 from 2s. to 1s. 10d. per 1000 cubic feet for ordinary consumers, and for power consumers from 1s. 7d. to 1s. 6d. This makes the Coatbridge gas the cheapest in Scotland.

MISCELLANEOUS NEWS.

PROFITS FROM GAS SUPPLY IN PARIS.

In the report made to the Paris Municipal Council by the Prefect of the Seine upon the Budget scheme for 1910, some particulars are given in regard to the profits derived from the supply of gas. Under the heading "Net profits from the working of the Paris Gas Company," he proposes to put down a sum of 23,600,000 frs. (£944,000), which is an increase of 100,000 frs. (£4000) on the amount inserted in the Budget for 1909, in which allowance was made for an increase of 1,000,000 frs. (£40,000) on the revenue in 1908. The growth in the consumption of gas is about 4½ per cent. annually; and assuming that this augmentation is not checked by the competition of electricity, it is assumed that the receipts next year will increase to the same extent, and consequently reach the figure of 24,560,000 frs. (£982,400). On the other hand, the various items of expenditure which did not appear in the Budget for the present year have to be taken into account. They arise from the change in the conditions of the stokers' work, the effect on the employees in the gas-works of the advances made in the salaries to the staffs in various branches of the municipal service, the necessary outlay on manufacturing and storage plant, additional payments to the Gas Company, and expenses in connection with the loan of 38,000,000 frs. (£1,520,000) which will probably be authorized next year by Parliament. In view of this extra outlay, the Prefect deemed it advisable to estimate the gas revenue at 23,620,000 frs. only.

SOUTH METROPOLITAN CO-PARTNERSHIP SCHEME.

The Year's Work.

The "Co-Partnership Journal" of the South Metropolitan Gas Company for next month opens with the following address by the Chairman, Mr. Charles Carpenter, on the year's work in connection with the co-partnership scheme.

With the passing of 1909, the test of another twelvemonth's working can be applied to our co-partnership. Its course has been, for the first year since its inception, unguided by the Founder's hand. Have we approached or receded from the goal he set up? Happily we can answer, without hesitation or uncertainty, that we are nearer the achievement of what he prophesied than when death stilled for ever the busy brain and sympathetic heart of the great master gas worker. The co-partnership which he originated may be regarded as the association of a body of happy and contented men, with differing mental and physical capabilities exercised in various spheres of life for providing the inhabitants in a large portion (and, on the whole, the poorest) of this great Metropolis with the advantages of cheap light, heat, and power. Sir George was always proud of his connection with a work of such character and magnitude; and we may well be proud of our part in it too. But it could never have become so complete in its usefulness unless we had first arrived at a thorough accord among ourselves. Co-partnership has brought about this result with an entirety unattainable by any other means. The thousands of South London gas workers have in their Elective Committee a medium for the promotion of all the interests they have in common with the shareholders of the Company and those who purchase its productions; while methods of working are made smooth before irregularities can become grievances or even hardships. No one who has been present at these deliberations can have failed to be struck by the conscientiously fair and earnest way in which the various members of the Committee proceed with their duties.

It is well known, however, that the employees' share in the management does not end with the Co-Partnership Committee. They elect three of their number to seats at the Board-room table; and whatever misgivings may have arisen when so radical a proposal was first mooted, it can be emphatically asserted that there is not a single Director who would now regard their presence as other than a necessity for the proper management of the Company's affairs. The credit for so remarkable—yet, in the light of our present knowledge, so obvious—a result must be shared between the employee shareholders and the admirable representatives they have chosen. Nor is this experience unique. I have now been associated for more than a year with the management of another undertaking, at the Board of which I sit with two working-men Directors; and I can truthfully say I look forward to my fortnightly intercourse with them as pleasurably as with the other members elected, like myself, by the ordinary shareholders. In this connection, I should like to mention the name of my colleague on the South Metropolitan Board, the late Mr. Edward Cardwell. He was respected by everyone who knew him as a true type of a thorough English gentleman, and not least by those of us who came into contact with him during the seventeen years of his directorship. One of his most intimate friends, whom I met at the funeral, told me that he had expressed to him grave doubts as to the desirability of Workmen-Directors when they were first proposed, but that he had lived to become a complete convert to the principle, and made no secret of the change which had taken place in his views.

Reverting again to our co-partnership, this has forged ahead during the past year in material as well as moral advantage. A larger percentage of the bonus earned has been invested in shares than in any previous year, and co-partners now hold stock in the Company which at the present market price is worth something like £316,000. Nothing can conduce to the prosperity of our co-partnership more than the increasing shareholding in it by the employees. But it is not the only factor. Our business is changing in its character, and now requires a much larger proportion of skilled knowledge than was the case when its co-partnership started nearly twenty years ago. This is not only true of the mechanics of all classes, but of their mates, and other handymen also; and it is increasingly necessary for them to avail themselves of every opportunity to increase the knowledge they have of the work

in which they are engaged. They should carefully read such books and periodicals as they can obtain, besides attending evening classes whenever possible. Copies of the chief publications concerning our business are provided for the use of workmen in all their lobbies, whether on the works or district, and will be found to contain much valuable information and many useful hints on gas and its uses. May I take this opportunity to put in a word for the benefit of those young fellows, still in their 'teens, who are mates to-day, and of whom many, it is hoped, will become skilled workers in the future? Do not lock up in your headpieces that knowledge which you have bought by years of labour and experience, but share it with the mate who is working with you, that when he arrives at man's estate he may be better equipped to meet its necessities, and more able when he takes to himself the sweetheart for his wife to make her a worthy home.

Looking back, then, we are justified in our satisfaction with the year's work. It has drawn tighter the bonds of that co-partnership of heart as well as muscle which has helped to raise the Company to the proud position it now occupies. It has also set the lessons for our endeavours during another twelvemonth, which it must be our aim to make worthy of its predecessors.

In the New Year's message from Swinburne to Mazzini (you remember how proud Sir George was of quoting his prophecy) on the eve of 1871, he says that, although he knows not whether the coming year will be one of light or darkness, he does know that—

> it will not part
> Heart's faith from heart,
> Truth from the trust in truth, nor hope
> From sight of days unscaled that ope
> Beyond one poor year's horoscope.

Our co-partnership inspires its participators with the same belief; and it is because of it that they can with confidence look forward to the dawn of 1910 as the beginning of what from my heart's heart I wish them all—

A HAPPY NEW YEAR.

NEW YORK PUBLIC LIGHTING.

The report of the Water, Gas, and Electricity Department of New York City for the year 1908 has lately been published by the Commissioner (Mr. John H. O'Brien); and some of the tabulated statistics in regard to the public lighting are given in the current issue of the "American Gas Light Journal." They are taken from the particulars furnished by the Bureau of Lamps and Lighting, the Chief of which is Mr. C. F. Lacombe; and we reproduce some of them below.

Expenditure on Public Lighting.

	Total.
Street and park lighting	$2,783,764
Lighting public building	709,137
Heat and power	67,201
Bureau expenses	29,742
Salaries	134,137
High pressure fire service	103,972
Testing electric meters	1,500
Total appropriations	$3,829,453
Revenue bond fund	2,587
Total	$3,832,040

Public Lamps in Use since 1901.

End of Year.	Electric Arc.	Electric Incand.	Gas.	Naphtha.	Total.	Candle Power.
1901	11,991	4076	41,381	4222	61,670	6,764,612
1902	12,431	4170	41,804	4198	62,603	7,052,750
1903	12,522	4674	43,098	4158	64,452	7,102,356
1904	12,739	4684	43,009	4217	64,649	8,061,852
1905	13,391	4248	43,067	4263	64,969	8,542,590
1906	14,218	4588	42,430	4273	65,509	9,702,056
1907	14,765	4745	43,636	4352	67,498	10,950,871
1908	15,441	6532	44,057	3336	69,366	11,428,020

During 1908 there were 4478 new lamps lighted, 3880 lamps relighted, and 6497 lamps discontinued. More than 6000 gas lamp-posts were repaired. There were upwards of 100,000 "outages" of all kinds of lamps; the totals being given in the next table.

Public Lamp Failures in 1908.

Greater New York.	Electric. Arc.	Electric. Incandescent.	Gas. Incand. Mantle.	Gas. Open Flame.	Naphtha. Mantle.	Total.
Inspectors	10,103	5269	29,271	79	14,543	59,265
Police	19,531	2388	18,209	2	6,201	46,331
Companies	3,686	82	..	..	..	3,768
Total reported	33,320	7739	47,480	81	20,744	109,364
Duplicates	2,152	136	2,354	..	1,999	6,641
Total deducted	31,168	7603	45,126	81	18,745	102,723

There are nearly 4000 miles of highways in Greater New York; and at the end of 1908 there were 3401 miles of mains in use for private and public lighting.

Length of Mains in Use during 1908.

Borough and Company.	In Use Jan. 1, 1908. Miles.	Feet.	New Mains Laid. Miles.	Feet.	Mains Disused. Miles.	Feet.	Mains Taken Up. Miles.	Feet.	In Use Dec. 31, 1908. Miles.	Feet.
Manhattan	1407	4786	8	2644	6	1171	4	4666	1405	1593
The Bronx	349	1072	12	4770	1	3843	1	1868	359	131
Brooklyn	1126	4364	26	1924	2	3330	3	2321	1147	637
Queens	382	4537	26	952	..	1612	2	4530	405	4617
Richmond	81	4382	1	4945	..	..	..	..	83	4047
Grand total	3348	3301	75	4665	10	4676	12	2825	3401	465

WEST HAM GAS COMPANY.

Final Meeting.

A Special General Meeting of the Company was held last Tuesday, at the Liverpool Street Hotel, E.C.—in accordance with the intimation given in the report of the Directors which accompanied the statement of accounts to June 30 last—"to receive a report from the Directors of their proceedings during the current half year." Mr. J. LISTER GODLEE, the Chairman of the Company, presided over a substantial gathering of stockholders.

The SECRETARY (Mr. A. G. Snelgrove) having read the notice convening the meeting,

The CHAIRMAN said that, in accordance with the promise made at the time of the last half-yearly meeting, the Directors had asked the stockholders to attend that day in order that they might lay before them a statement as to their proceedings during the present half year—though there were, of course, no accounts to present.

PROGRESS IN THE PRESENT HALF YEAR.

The Directors had assumed that the stockholders would be prepared to take a verbal statement from him, as there was hardly sufficient material out of which to construct a printed report; and it was impossible to lay before the meeting anything in the nature of accounts. But he might say here that it was proposed that the half-year's accounts should be worked out by the officers who had been employed over them during the half year; and the Gaslight and Coke Company would distribute copies of the balance-sheet, &c., among those who were stockholders in this Company, with a statement of the dividend to be paid. The immediate imminence of the amalgamation had, of course, confined the duties of the Directors to watching over the working of the concern and over the arrangements for carrying out the change. It had not been for the Board to make provision for next year's working, which would be in other hands. But the business of the Company had shown steady and satisfactory progress throughout the five months that had elapsed. It would not be satisfactory to place before the stockholders any statement of expenses and income for a period of this sort; but from figures supplied to him by the Engineer, he anticipated that the accounts would show a material saving in coal and oil, though larger quantities of each had been used, and satisfactory increases in sales of residuals, except sulphate of ammonia, in which there was a considerable falling off. The sales of gas during the five months showed an increase of 5·98 per cent. over those for the same period of 1908. The increase of consumers by automatic meters had continued; and since the system was introduced in 1902, there had been installed about 52,500 of them, of which more than 48,000 were now actually in use by consumers. The work of the Company had gone steadily forward; and the arrangements made by the Board a year ago, after Mr. Clark's death, for dividing his duties among other officers, had worked quite satisfactorily. Great credit was due to the officers for making this possible.

THE AMALGAMATION ARRANGEMENTS.

The arrangements for the taking over of the business by the Gaslight and Coke Company were nearly complete; and he anticipated no difficulty in carrying them out. He thought the few figures he had given the stockholders would satisfy them that the half year that was coming to an end was likely to show results as satisfactory as those that had gone before it, and that the approach of the amalgamation had not led to any slackening in the energy with which the business had been conducted in the past. On Dec. 31, the Company would cease to exist, except to this extent—that there would still exist for a period of three months a something bearing its name whose powers could, he supposed, be exercised by the present Directors, who would be able, if occasion should arise, to take proceedings against the Gaslight and Coke Company to enforce any of the terms of the agreement entered into between the two Companies a year ago. But he did not see any probability of occasion arising for the exercise of these powers.

A GLANCE AT THE PAST.

An occasion like this inclined one to look a little at the past; and he would be excused for reminding the stockholders that the Company had been in existence since the year 1846. There was a supply of gas of some sort in West Ham prior to that time; but the price that was charged for it—8s. per 1000 cubic feet—and other matters connected with the supply, having caused some dissatisfaction, a public meeting of parishioners of West Ham was held in November, 1845, when it was decided to form an independent Company, regulated by a Deed of Settlement, which, under the name of the West Ham Gaslight and Coke Company, was registered in May of the following year. Within eighteen months, there were 84 shareholders in the Company, almost all of whom were residents in the parish. It called itself a Consumers' Company, having as its object to supply pure gas at the lowest price consistent with a fair return for the capital invested; and in pursuance of this object, the price of the gas was at once reduced to 6s., and shortly afterwards to 5s. per 1000 cubic feet—which those present would compare with the 2s. 8d. now charged by the Company. In the year 1856, an Act of Parliament incorporated the Company under the name it now bore, and confirmed an agreement by which the Company purchased the mains and other property in the parish of the Company who had been supplying gas before the new Company was formed. At that time, the capital of the Company amounted to £13,985; and a further £13,000 had been borrowed—£3000 upon the security of a mortgage of the leasehold property of the Company, and £10,000 upon the promissory notes of the Directors—a class of security which the stockholders would hardly expect the Directors to give at the present day. From these small beginnings, the Company had gone on increasing, until the 84 shareholders, with the holders of the mortgage and promissory notes, were now (sixty-four years after the formation of the Company) represented by 1770 stock and debenture holders. The capital of £13,985 had grown to £1,441,000; and, to take a somewhat later figure, the amount of gas sold in a year, which in 1860 was 53,000,000 cubic feet, would in the present year probably amount to over 2,007,000,000 cubic feet. He would venture to give them a few more figures of which

he thought it might be interesting to have some record; and for this purpose, he would take an intermediate year, near the middle of the life of the Company. He would fix upon the year 1874, because this was the year when he first sat among the Directors at a general meeting of the Company; and he had the figures at hand. At the time of which he was speaking, Mr. Thorman, who was the Engineer of the Company when it first set to work, still occupied this position; and he continued to do so for seventeen years longer. It took more than one man to do his work now. Then there was one collector for the whole district; now there was a small army of them. The two large gasholders—one at West Ham and the other at East Ham—were not then dreamt of. The paid-up capital was less than one-tenth of what it was now. The half-yearly rental was about £13,000; whereas last half year it was about £140,000. The total charge for wages and salaries was about £2300; while last half year it was nearly £18,000. Last, but not least, the charge for rates, taxes, and rent was £608; whereas in the past half year, without any rent, the rates and taxes cost the Company £6500. Add to this that for many years past the full amount of the statutory dividends had been divided or added to the Company's reserve fund, and he claimed to have placed before the stockholders a very satisfactory history of progress and success. And this progress still went on. In the nine years that had elapsed since 1900, the actual paid-up capital had more than doubled; and the annual make of gas had risen from 1100 million to 2027 million cubic feet. These figures, he supposed, never presented themselves as possible to the man of the liveliest imagination who attended the meeting that was held in Stratford, under the chairmanship of Sir John Pelly in November, 1845.

FEELINGS OF PRIDE AND REGRET.

He had put these facts and figures before the proprietors, because he wanted them to feel proud of the Company, and to feel that in entering upon an amalgamation with the Gaslight and Coke Company, though the West Ham was a very small concern compared with the other, they were taking with them a business of which they had not the slightest cause to be ashamed. ("Hear, hear.") The time of this amalgamation was now close at hand. It must bring with it some regret at the loss of a name with which they had long been familiar, and at the breaking up of associations with men with whom the Board had worked in hearty co-operation for many years, and with many whom one had been led to respect and admire for their steady and loyal work in the interests of the Company. Perhaps they would allow him for a moment to allude to himself. After having been a Director of the Company for no less than 35 years—more than half the life of the West Ham Gas Company, and somewhat more than half of his own—and after presiding over the meetings of proprietors and of the Board of Directors for over seventeen years, he naturally shared these feelings to the full. It closed for him a chapter which for a long time had been a very interesting one. But these regrets would, for most of them, be only temporary. This was no funeral. The West Ham Company was hale and hearty, and in full possession of its powers, with no suggestion of faintness or disease. He would call it rather the entering into a partnership between two men—a big one and a little one, he agreed, but both strong men—a partnership which he believed would be to their mutual advantage, which would give increased satisfaction to those who were concerned in the West Ham Gas Company, and which would increase their power of supplying to their consumers what was now and here one of the necessities of life.

GRATUITIES TO OFFICERS.

Of course, the proprietors did not expect a long speech from him; and he had done. Before, however, he sat down, his colleagues had asked him to announce the way in which they had decided to deal with a sum of £5000 out of the undivided profits, which the agreement with the Gaslight and Coke Company specially authorized them to expend in making gratuities to any salaried officers whom they might consider specially deserving thereof. The Directors had decided to hand to Mr. Snelgrove, who had been Secretary of the Company since the year 1888, and who had since Mr. John Clark's death last February taken over such part of the duties formerly entrusted to Mr. Clark as did not come strictly within the Engineer's department, 1000 guineas. To Mr. Wright, who, having been previously employed by the Company, was appointed Assistant-Engineer in 1894, and who since Mr. Clark's death had taken over a large part of his duties in the post of Acting-Engineer, £1000. To Mr. G. T. Gwinn, the son of the first collector of the Company, who was himself appointed a collector in 1881, and who in 1906, on the institution of a separate rental department in the Company's offices, was appointed head of that department, with the organization of which he had the main responsibility, £750. To Mr. E. Madge, a son of the Mr. Madge who was Secretary of the Company for 22 years, who became a clerk in the Company in 1881, and was now Assistant-Secretary, £600. To Mr. H. N. Clark, who entered the Company's service as an Engineer's Assistant in 1894, and had been largely responsible for the distribution work of the Company, £600. To Mr. Bull, who was Mr. Gwinn's principal assistant in the rental department, £300. To Mr. J. S. Thorman, who was appointed an assistant to the Engineer in 1896, and who had had to do with the water-gas plant of the Company, £250. To Mr. H. Lethbridge, a clerk in the Engineer's department, after 22 years' service, £200; and as a small recognition of their services for several years, to give to Messrs. Logue, Inder, and Biggs, who were cashiers in the Secretary's office and the rental department, £50 each; and to five of the collectors who had been in the Company's service for more than ten years—namely, Messrs. Parsons, Wilson, A. L. Gwinn, Stevens, and Clarke—£20 each. These payments all gave expression to the feeling of admiration for service to the Company over long series of years, well done, and deserving of such recognition at the hands of the proprietors at the time when this service to the Company came to an end. The Directors anticipated that the stockholders would approve of their action in this matter. It had been a great satisfaction to the Board to have the power to do this placed in their hands.

THE SERVICES OF THE CHAIRMAN.

The DEPUTY-CHAIRMAN (Mr. H. Cecil Pelly) remarked that on an occasion like the present, when they were holding their last general meeting with the stockholders in the Company, one could not help to some extent looking back and reviewing the past. In doing so over the eighteen years during which the proprietors had entrusted him with a seat on the Board, there were one or two features which were prominent in his mind. First of these was the happy relationship that had always existed between the stockholders and the Directors. He could not recall any occasion at any meeting which one could look back to with any regret; but, on the contrary, the meetings had always been of the most cordial and pleasant nature. For this, and for the support that the proprietors had always extended to the Board, his colleagues and he would like to take this opportunity of tendering them their most cordial thanks. Then, again, one looked back on the progress the Company had made. The Chairman had dealt with this in his speech; and he need not quote any figures. The enormous strides the Company had made were well known to all; but what had been the cause? No doubt, principally it had been the large developments in building and increase in population in the district that the Company had served. But if it had not been for the officers in all departments, they would never have been able fully to utilize these developments. He would like to confirm every word the Chairman had said about the officers, and to add his own personal thanks for assistance and advice they had so often rendered in the management of the Company's affairs. Once again taking a retrospective view, reminded him of another feature he wanted to mention, though it was perhaps unusual to do so from that side of the table. But the present occasion was exceptional. He referred to the Chairman, Mr. Godlee. There was no need to say anything with regard to the way in which he had presided over the general meetings—the proprietors were well aware of this. But he did desire to say publicly how his colleagues had appreciated his clear-sighted judgment upon the Company's concerns, his genial and patient forbearance at the Board meetings, and, above all, his close attention to business—for he believed he was right in saying that he had never missed a general meeting during his chairmanship, and only on one or two occasions had he been absent from the Directors' meetings. It was satisfactory to all of them to feel that they were represented by him on the Board of the Gaslight and Coke Company. In thus briefly mentioning one or two matters which the occasion justified, he would express the hope that the cordial relationship which had existed between the Directors and the stockholders of the West Ham Company might be continued with the new Board—that of the Gaslight and Coke Company—and that many of the proprietors (and he would be with them on the shareholders' side of the table) would meet twice a year at Horseferry Road to support Mr. Godlee and the other members of that Board. In conclusion, so that those stockholders who were unable to be present at the meeting that day might have the benefit of the interesting sketch of the history of the Company given in the Chairman's address, he would move that the speech be printed and circulated among the proprietors.

Mr. FRED. NICHOLSON seconded the proposition, and thoroughly endorsed every word Mr. Pelly had said about the Chairman. He believed that Mr. Godlee would prove a source of strength to the Board of the Gaslight and Coke Company.

The CHAIRMAN then invited questions; but as there were not any forthcoming, he put the resolution to print and circulate his speech, and it was at once carried unanimously.

A VOTE OF THANKS.

Mr. R. L. CARTER proposed a hearty vote of thanks to the Chairman and Directors for their attention to the Company's affairs during the time they had presided over them. There were some regrets in making the change; but, at the same time, it was all, he felt sure, for their good.

Mr. WIGLEY, who seconded, said that, along with their regrets, they should be pleased that they were going over to a gigantic Company who would look after affairs in the interests of every one of them.

The CHAIRMAN, in acknowledgment, remarked that the Board regarded the resolution as something more than those usually passed at the half-yearly meetings, inasmuch as it was an expression of thanks for work extending over many years. His own position was perhaps a little exceptional. He had been on the Board for 35 years; and there came a gap between that and the next senior, Mr. Pelly, of 17 years. Therefore a good many men had passed out of the Company, who had sat with him, besides his present colleagues. In fact, he had sat with nine other men as members of the Board. It had been to him work which was very interesting, and work which he had thoroughly enjoyed; and it was a great satisfaction to him to hear the kind words which had been said that day upon the manner in which he had performed his duties. All the Directors had devoted much care, time, and attention to the work; and they were extremely glad that it was appreciated. He had had from his colleagues all that assistance without which his work could not possibly have been done. Within the last few months, he had had from the Vice-Chairman great help in matters which Mr. Pelly, having offices in London, was able to attend to, and which were not easy for him (the Chairman) to look after now he lived away from town. Ever since he had known it, the Board had been a cordial and hard-working one; and he hoped that they might reflect that this had had some influence on the satisfactory and comfortable working of the Company. He hoped at Horseferry Road to meet the proprietors, and to shake hands with many old friends. He could not sit down without saying that the Board wished to give their heartiest thanks—in which he felt sure the proprietors heartily concurred—to the officers, who had kept the undertaking going, and worked it so satisfactorily as to bring out the results which had placed the Company in the position it now occupied. "Gentlemen," he said, in conclusion, "I bid you good-bye."

Bingley and the Wilsden Gas Supply Rights.—At a meeting of the Bingley District Council on Monday last week, the Gas Committee reported that the Bradford Corporation had named £20,000 as the price they required for the rights of gas supply in Wilsden; and on the recommendation of the Committee, it was decided that a statement should be prepared showing the annual cost in the event of the offer being accepted and a new main being laid for the supply of Wilsden from the Bingley Gas-Works.

BUENOS AYRES AND ITS GAS SUPPLY.

Amalgamation of the Buenos Ayres (New), the River Plate, and the Primitiva Gas Companies.

A series of meetings was held last Tuesday of the debenture holders and shareholders in the Buenos Ayres and River Plate Gas Companies and of the shareholders in the Primitiva Gas Company, to pass resolutions to effect the carrying out of the provisional agreement, to which reference has been made in the "JOURNAL," for the amalgamation of the concerns.

Buenos Ayres Debenture Holders.

The first meeting was that of the debenture holders in the Buenos Ayres (New) Gas Company, held at the London Offices, No. 1, East India Avenue, E.C.—Mr. JOHN CONRAD IM THURN presiding.

The CHAIRMAN said those present would no doubt expect him to explain briefly the facts of the case as regards the security of the debentures, and also why the three Gas Companies in Buenos Ayres were now amalgamating. Their trust deed of July 8, 1907, gave the debenture holders a floating charge on the assets of the Company; and for this it was now proposed to ask them to accept a floating charge on the assets of the combined Companies, which, in the Directors' opinion, and in that of the Trustee, improved the security of the debentures. There were many reasons why it had become necessary to amalgamate the three Companies. For a good many years now, there had been a recurrence of difficulties with the municipal authorities, which had always been a source of trouble, and sometimes anxiety, to the Board. It was felt it was time to make an effort to come to some terms with the Municipality; so that the gas industry might feel that it was no longer to be hampered by unnecessary and unreasonable terms. In the year 1895, what was thought by the Directors to be a definite scheme was agreed to by the Municipality. A sliding-scale of charges was then arranged, based upon the fluctuations of the gold premium; and for a period of about ten years, this seemed to answer fairly well. But in 1906, an agitation was started in the Press, and also by certain members of the Municipal Council, demanding a reduction in the charges; and although the Directors resisted any alteration to the agreement made in 1896, they were again forced to negotiate with the authorities. In 1906, the agitation recommenced; and a proposal was put forward which would have entailed the handing over of the whole three Companies, free of cost and charge, to the Municipality at the end of fifty years. Even this did not satisfy the extremists; and the negotiations proved abortive. Ever since then the Board had taken endless trouble to come to a satisfactory arrangement; and at the general meetings the shareholders had been told exactly what was going on. Things came to a head in 1906, when the Municipality promulgated an ordinance or decree fixing, in the most arbitrary way, the selling price of gas, at figures which would have ended in the ruin of the Companies. The Company might have earned their debenture interest; but there would certainly have been no dividends to the ordinary shareholders under the impossible prices and conditions demanded by the ordinance. Those present could imagine that this was a serious state of things; for the ordinance was to commence in 1908. The Board, in conjunction with the Boards of the other two Companies, working in perfect harmony, tried every possible means to induce the authorities to give them time to arrange the question; and, finally, consent was given to a reduction of 2 cents per cubic metre from Sept. 30, 1908, pending further negotiations with the Lord Mayor and the Municipal Council. At that time, it so happened, and very fortunately happened, that the authorities were anxious to obtain possession of the land at Retiro on which the Primitiva Gas Company's works were erected. This land immediately adjoined a site on which a very large new station was being built by two of the greatest Railway Companies in Argentina. It therefore came about that the Primitiva Company were in a position to negotiate under favourable circumstances with the Municipality, and secure for the gas industry a fair agreement. The best method seemed to be to amalgamate all the Gas Companies; so that the Primitiva Company might secure for the whole gas industry in Buenos Ayres the most favourable terms. This was what brought about the proposed amalgamation. The Directors had given the greatest consideration to the position of the debenture stockholders. In order that it might be understood how careful the Directors had been of the debenture holders' interests, he should like to read an extract from a letter from the Chairman of the Trustees (the River Plate Trust Loan and Agency Company), which was written to Mr. Bowen, the Chairman of the River Plate Gas Company. Two proposals were brought forward; and this was what Mr. Anderson said:

First Proposal.—That the fusion of interests be carried out by the Primitiva Company acquiring the shares of the two other Companies, keeping them alive, and taking from them leases of their properties. This would not affect the rights of the debenture stockholders, and, in consequence, it would be carried out without requiring their assent.

Second Proposal.—That the Primitiva Company purchase the properties of the River Plate and Buenos Ayres New Gas Companies, subject to their respective debenture stocks, which would retain their existing specific security; but the guarantee of the Primitiva Company would be substituted for those of the River Plate and New Gas Companies respectively. Further, that, in addition to assuming the responsibility for these two debenture stocks, the Primitiva Company would undertake to set aside a sinking fund of 1 per cent. per annum, to be employed annually in the purchase and cancellation of the respective debenture stocks, while they could be purchased on the market within the redemption prices—viz., 105 in the case of the River Plate Gas Company, and 102½ in the case of the Buenos Ayres New Gas Company. This plan would require the assent of the debenture stockholders of both Companies, in view of the substitution of the guarantee of the Primitiva Company for those of the two other Companies.

I have carefully considered the alternative proposals, and am of opinion that the second would be the more advantageous of the two to the stockholders. My reasons for so thinking are, firstly, that the security at present enjoyed by the debenture stockholders would not be diminished; and, secondly, because the creation of such a substantial sinking fund as 1 per cent. applied in the manner above mentioned would tend to substantially increase the market prices of the stocks. I think the difference in market price might not unfairly be put at four or five points, as compared with the stocks as they now stand without any provision for repayment.

The fact that the security now held by the debenture stockholders of the two Companies would not be diminished will, I think, be appreciated, when one considers that the whole debenture stock of the Primitiva Company, capital as well as interest, is provided for out of the balance of the purchase-money of the electrical part of the property sold some years ago to a thoroughly responsible purchaser. The charge for this debenture stock, therefore, is provided so to speak from an outside source, and would not be a burden on the earnings of the combined Companies. It follows, therefore, that all the earnings of the Primitiva Company would come in as additional collateral to the security now enjoyed by the debenture stockholders of the two other Companies; thereby increasing their marginal security.

Of the two alternatives, it was therefore decided to accept the latter, as both Mr. Anderson and the Directors thought it was the best in the debenture holders' interest. If they agreed, the specific security on the properties of this Company would not be in any way affected; and though they would lose the floating charge on the assets of the Company, they would receive, in lieu, a floating charge on the assets of the combined Companies, subject to only the Primitiva Company's charge in favour of their debenture stock holders. The debenture stock of the Primitiva Company was provided for out of the balance of the purchase money of the electric section of their property, sold some years ago to the German Electricity Company. This Company was a very strong one in every way; and they had undertaken to repay the debentures of the Primitiva Gas Company by half-yearly instalments, terminating in 1943. The German Company, however, had the power to pay off at any time, on short notice, the balance outstanding; so as a fact the floating charges, if the debenture holders accepted the proposition, and the River Plate Gas Company debenture holders did likewise, would really be a first charge on the whole of the assets of the combined Companies. In addition to this floating charge, the Directors had arranged with the Primitiva Company that they should set aside a cumulative sinking fund of 1 per cent., to be applied to the purchase of the stock in the market, or annual drawings at 102½. He (the Chairman) thought the market that day reflected the favourable position of the debenture holders. He would next read a copy of a letter written by the Trustees to one of the debenture holders, in reply to a letter from him.

In reply to your favour of yesterday's date, I beg to say that this Company [River Plate Trust Loan and Agency Company], as Trustees for the holders of the above stock, does approve of the proposal now before the stockholders, under which the guarantee for the payment of interest and capital of the stock will be transferred from the Buenos Ayres New Gas Company to the Primitiva Gas Company. Our reasons for so doing are, firstly, that we consider the stock will be better secured under the new arrangement; and, secondly, that the market price will be improved by the provision of a sinking fund for redemption of stock at a premium. Our opinion as regards the latter point has already been confirmed by the price having advanced 3 per cent. immediately after the publication of the proposed arrangement.

As regards your questions as to the value of what the debenture stockholders are asked to give up, and of what is proposed to be substituted for it, I would point out that the specific charge on the real estate and fixed plant of the Buenos Ayres New Gas Company now held under the trust deed will remain unchanged, and that what is proposed to be given up is simply the charge on the floating assets and the general guarantee of payment of capital and interest, which will be transferred from the Buenos Ayres New Gas Company to the Primitiva Company. The best way of arriving at an opinion as to whether the security will be improved or otherwise by the proposed change appears to me to depend on whether the margin of profit arising from the ordinary business of the Company, after payment of the debenture charge, will be increased or diminished. From the last published accounts of the Buenos Ayres New Gas Company (for the year 1908), the trading profits amounted to £67,000, as against a debenture charge of £10,000, showing a margin of £57,000, or 570 per cent. Now if we were to assume that the arrangement proposed had been carried into effect on Dec. 31 last, the trading profits of the River Plate Gas Company, the Buenos Ayres New Gas Company, and the Primitiva Company, which would have been available for the payment of the interest on the debenture stocks of the River Plate Gas Company and the Buenos Ayres New Gas Company (a charge together amounting to £22,500) would have been £200,000. There would thus have been a margin of profit, after payment of the interest on these two debenture stocks, of £246,500, or over 1000 per cent. on the debenture interest. The margin of security therefore is, in round figures, almost double, so that I think there cannot be any doubt that the arrangement is one which it is to the interest of the debenture stock holders of the Buenos Ayres New Gas Company to fall in with.

Finally, he would read the opinion of Sir Francis Palmer, the eminent Counsel on Company matters:

Then as regards the debenture stockholders, the New Gas Company's liability in respect of the debenture stock is to be transferred to the Primitiva Company, which will take the place of the New Gas Company, and become liable in respect of the debenture stock. The specific security which the debenture stockholders have is to be preserved, and a floating charge on the undertaking of the Primitiva Company is to be substituted for a floating charge on the undertaking of the New Gas Company, which will be absorbed in the undertaking of the Primitiva Company. Besides this, the Primitiva Company is to be bound to establish a sinking fund for the redemption of the stock, and to carry thereto each year £2500, *plus* interest on the stock from time to time redeemed by the operations of the fund, and to apply the fund each year in redeeming stock by purchase in the market, or by drawings, and thus gradually reduce and extinguish the stock. Thus it seems that the position of the debenture stockholders will be considerably improved and their security, regarded as a whole, largely enhanced in value.

The CHAIRMAN moved, and Mr. ROSS PINSENT seconded, the adoption of the resolutions. The first provided for the confirmation of the provisional agreement, dated Dec. 2, 1909, and made between the Company and the Primitiva Gas and Electric Lighting Company of Buenos Ayres, Limited, for the sale of the Company's undertaking and assets [excepting only £150,000 nominal value in shares of the South Barracas (Buenos Ayres) Gas and Coke Company, Limited] subject to the outstanding £250,000 debenture stock, for shares in the Primitiva Company. The second resolution sanctioned an arrangement between the Company and the debenture stockholders, to take effect on completing the sale: (*a*) The floating charge created by the trust deed of July 8, 1897, securing the Company's debenture stock to be released; and the shares in the Primitiva Company to be allotted under the provisional agreement; and the £150,000 in shares of the South Barracas Gas

Company to be distributed among shareholders of the Company, provided that this arrangement shall not affect the specific charge created by the trust deed. (*b*) The Primitiva Company to undertake to pay all principal money and interest payable under the trust deed of July 8, 1897, and also forthwith to give as additional security for the Company's debenture stock a floating charge upon the Primitiva Company's undertaking and uncalled capital, subject to the specific and floating charges by which its own debentures are secured, and to the specific charges by which the debenture stock of the Buenos Ayres Company and the debenture stock of the River Plate Gas Company are now respectively secured. (*c*) The Primitiva Company to covenant or agree with the trustees of the trust deed of July 8, 1897, to establish a cumulative sinking fund of 1 per cent. per annum for the redemption of the debenture stock of the Company by purchase in the market under 102½ per cent., or, that failing, by annual drawings at 102½ per cent. (*d*) The Primitiva Company to be at liberty to create a floating charge on their undertaking (ranking *pari passu* with the floating charge to be given as above mentioned), to secure the £350,000 debenture stock of the River Plate Gas Company, with a cumulative sinking fund of 1 per cent. per annum for its redemption.

Moved by Mr. A. B. BOSHER, a vote of thanks was passed to the Chairman and Directors.

Meeting of the Buenos Ayres (New) Ordinary Shareholders.

An Extraordinary General Meeting of Shareholders of the Buenos Ayres (New) Gas Company was subsequently held—Mr. JOHN C. IM THURN again presiding.

The CHAIRMAN, in his address, described the difficulties and the events that led up to the securing of an *ad referendum* contract in much the same way as he did at the meeting of debenture holders. The contract, he said, did not give the Company all they wanted; but at all events it gave them all they could get, and they were very much indebted to the Local Committee and their Manager, Mr. Obarrio, for the constant and unremitting labour and skill which they had given to the work. Clause after clause of the contract had been a matter of long and difficult negotiations; and only at the very last moment were they sanguine of getting it passed by the Municipal Council. Mr. Samuel Hale Pearson, of the Primitiva Company, was the immediate negotiator of the contract; and to him also they were greatly indebted for getting it passed. By the contract, the Primitiva Company had to give up their works in 1910; and, of course, the Buenos Ayres and the River Plate Gas Companies had to take up the burden of making the whole of the gas for the amalgamated concerns. He might mention here that the amalgamation had been sanctioned by the contract. The basis of the amalgamation of the Companies was investigated by the well-known firm of Chartered Accountants, Messrs. Deloitte, Plender, Griffiths, and Co.; and this basis was arrived at, as far as possible, on the profits made by each Company for the last few years—endeavouring as far as possible to secure to the shareholders at least the same dividends as they had been having previously. Taking that day's market price of the shares (over £14 for a £10 share) as an indication, the Directors thought the shareholders would be satisfied with the terms arranged. This compared with 11¼, which was the price in December last year before the negotiations were made public. The value of the shares would roughly be 14½ to 14⅝ on present market value. It would be readily understood that there must be fractions, and that these must be paid in cash. The reason why this Company and the River Plate Gas Company were being absorbed by the Primitiva Company, was that the Primitiva Company was the only one of the three in a position to make a bargain with the Municipality. He thought the shareholders would agree with him that, in the past, the Company had been conducted successfully. It was registered over 35 years ago, during the whole of which time he had been a Director, and had taken a leading part in the affairs of the undertaking; and he might add that he was the largest shareholder. He was convinced, in his own mind, that the terms of the amalgamation were as good as they could have made, and that the future of the amalgamated Companies was a bright one. The amalgamation would take effect as from the first day in the New Year. Three of the Directors would join the Board of the Primitiva Company. The Manager in Buenos Ayres would continue in the management of the combined Companies; and their Secretary (Mr. Macmorran) was to be the Secretary of the amalgamated Company. The Directors were glad to announce that Mr. A. E. Bowen, the Chairman of the River Plate Gas Company, had consented to become Chairman of the amalgamated Company. It had been further arranged that Mr. H. E. Jones and himself (Mr. im. Thurn) should be Vice-Chairmen. It had not been possible to decide which of the officers of the old Companies would be retained. Of course, one of the great advantages of an amalgamation like this was the reduction of expenses, which included a reduction of staff; but the servants of the Company whose services were dispensed with would be compensated by the Primitiva Company. He should, in conclusion, like to read extracts from the opinion of Sir Francis Palmer:

> It seems to me that the scheme will, if adopted, benefit all parties. It will unite and continue the undertakings of the three Companies into one strong concern, and so will minimize the cost of administration, avoid needless competition, and add largely to the security of all who are interested in the concerns.
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> First as to the shareholders in the New Gas Company. They will receive in respect of every £7 of shares in the New Gas Company £2 10s. in ordinary fully-paid-up shares of £5 each in the Primitiva Company, and £5 in cumulative fully-paid-up preference shares of £5 each in the Primitiva Company; and beyond this they will receive their proper proportion of the paid-up shares in the South Barracas (Buenos Ayres) Gas and Coke Company, Limited, which carries on a successful and promising business to the south of the River Riachuelo.
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> In addition to this, the shareholders in the New Gas Company will receive a dividend to the close of the current year at the same rate as they received for 1909, and what is more three of the Directors of the New Gas Company will join the Board of the Primitiva Company, thus securing continuity of action and experience.

The CHAIRMAN, replying to a shareholder, said the South Barracas Company was an entirely independent Company, owned hitherto by the Buenos Ayres Gas Company. Shares would now be distributed, as soon as convenient, as South Barracas shares. The nominal value of the shares was £150,000; and they would be distributed *pro ráta*, according to the holding of the shareholders in the Buenos Ayres Company. What it really amounted to was the distribution of the reserve fund in the Buenos Ayres Company. The business in the South Barracas district was a growing one, and the district was developing rapidly.

Moved by the CHAIRMAN, seconded by Mr. ROSS PINSENT, a resolution was passed in the same terms as the first one adopted at the meeting of the debenture holders.

Proposed by the CHAIRMAN, and seconded by Mr. NESHAM, other resolutions were passed providing for the voluntary winding up of the Company, appointing Mr. Frederick Charles im Thurn and Mr. Ross Pinsent Liquidators for the purpose of the winding up, and authorizing them to carry into effect the provisional agreement. Finally, the shareholders approved of "the draft instrument or instruments submitted to this meeting, whereby the Primitiva Gas and Electric Lighting Company of Buenos Ayres, Limited, is to take the place of the Buenos Ayres (New) Gas Company, Limited, in regard to the debenture stock of the said Company, and is to pay the two outgoing Directors of the said Company £1000 each, and is to compensate those members of the Argentine Committee and other servants of the Company whose services are not continued, by way of compensation and in full satisfaction."

A vote of thanks was passed to the Chairman and Directors and the staff, on the motion of Mr. BOSHER, seconded by Mr. M'DOWELL.

The CHAIRMAN responded for all, and added that the Directors had always wished to see one united Company to serve the big city of Buenos Ayres, which had a population (he thought it was now) of 1,300,000. It must clearly be more advantageous to work with one Company than to have three Companies competing with each other all over the city.

River Plate Debenture Holders' Meeting.

Early in the afternoon, a meeting of the holders of the debenture stock in the River Plate Gas Company, Limited, was held under the chairmanship of Mr. A. E. BOWEN.

The CHAIRMAN, in his address, traversed the ground, at perhaps somewhat greater length, covered by the speech of Mr. im Thurn at the debenture holders' meeting of the Buenos Ayres Company. He explained why it had become necessary to amalgamate the three Companies; and why the Board asked the debenture holders to release the floating charge on the assets of the Company—created by the deed of Nov. 3, 1897, and accept in lieu thereof a second floating charge on the assets of the combined Companies. As to the troubles with the Municipality, his recollection went back more than twenty years; and he thought it was quite that time since they first made an effort to come to terms with the Municipality. The climax was reached when the Municipality promulgated an ordinance, in 1908, fixing the selling price of gas at figures which would have meant, practically, the ruin of the Companies. It would have meant that it would have been impossible to earn any dividend for the ordinary stockholders; and, if the Directors had been compelled to accept the prices stipulated in the ordinance, he doubted very much whether they would have been able to pay even the debenture interest. This was, of course, a most serious state of things. The ordinance was to take effect on Jan. 1, 1908. But, after exhausting every possible argument, they succeeded in inducing the authorities to give them a little more time; and, finally, they agreed to make a reduction of 2 cents per cubic metre, as from Sept. 30, 1909, pending further negotiations with the Lord Mayor. It happened, however, fortunately for the Company, that the authorities were exceedingly anxious to get hold of the land upon which the Primitiva Gas Company's works stood. The Companies took advantage of this to formulate a definite contract with the Municipality. In order to be able to cede this land to the Municipality, the Primitiva Company had to arrange with the other two Gas Companies for the necessary supply of gas; and the best way of doing this seemed to be by the amalgamation of the three Companies, or really the purchase of the two Companies on terms with which those present were acquainted. The Chairman then read the letter from the Chairman and Managing-Director of the Trustees for the debenture holders, as quoted in the report of the proceedings at the meeting of the Buenos Ayres debenture holders. The opinion expressed in the letter had almost been borne out by the fact that since the proposals became known, the stock had gone up about three points. If the debenture holders agreed to the more advantageous proposal, their specific security on the properties of the Company would not be in any way affected; but they would lose their floating charge on the assets of the Company, and accept, in lieu, a floating charge on the assets of the combined Companies, subject only to the Primitiva Company's charge in favour of their debenture stockholders. The Primitiva debentures were, however, provided for out of the balance of the puachase-money of the electrical part of the property sold years ago to the German Electricity Company—a great corporation and one of undoubted responsibility. So, really and truly, the floating charge of their own debenture holders, and that of the Buenos Ayres (New) Gas Company's debenture holders, would be a first charge on the whole of the assets of the combined Companies. That this statement was correct was proved by the following letter, which had been received from the Solicitors of the Primitiva Company:

> As arranged, we beg to state that the position of the Primitiva Company *vis-a-vis* the German Electricity Company is as follows: In the year 1903, negotiations for the disposal of the electrical portion of the Primitiva Company's undertaking to the German Company were completed; and an agreement between the two Companies, dated Aug. 12, 1903, was entered into. This agreement provided for the payment to the Primitiva Company, as the consideration for its electrical business, land, buildings, and electric installation, of 81 half-yearly payments—the first 80 of £15,000 each, and the last payment of £19,234; the payments being calculated to represent the principal sum of £600,000, with interest in the meanwhile on the amount unpaid at 4 per cent. per annum, with half-yearly rests. The whole of the money is paid into the joint account of the Primitiva Company and the Trustees for the holders of its debentures. The titles remain vested in the name of the Primitiva Company until the last payment has been made; but the

German Company has the right of entering into free use of the property, subject to an undertaking that it would not create any mortgage or charge until the last payment has been made. The German Company has also the option of paying off on any May 31 or Nov. 30 (on notice) so much of the £600,000 of principal moneys as may remain unpaid, together with interest at 4 per cent. per annum to date of payment, or any portion of such principal moneys, being not less than £10,000, such payments and advance being taken on account of the yearly sums payable at the end of the period, subject to an allowance for compound interest at the rate of 4 per cent. per annum with half-yearly rests, so as not to interfere with the regular half-yearly payments. The resolutions duly passed by the debenture holders of the Primitiva Company sanction the arrangement. The whole of the payments above-mentioned are applied or set aside for payment of principal and interest in respect of the debentures of the Primitiva until the whole are redeemed. The total authorized debentures were £60,000, of which £558,100 are now outstanding.

As the debenture holders knew, they were entitled under the trust deed to be paid off at 105 in case the Company were liquidated; but, if they insisted upon this, they would, of course, adopt the other alternative of keeping the Company alive. In order, however, to make the proposition more favourable, they had arranged with the Primitiva Company that there should be set aside a cumulative sinking fund of 1 per cent., to be applied to the purchase of the stock in the market, or by annual drawings at 105. The Directors had every confidence that this sinking fund would considerably improve the market value of the security.

On the motion of the CHAIRMAN, seconded by Mr. OGILVIE, all the necessary resolutions were unanimously passed. Deleting the portions referable to the South Barracas Company, altering the date of the deed to Nov. 3, 1897, the resolutions were in effect the same as those passed by the Buenos Ayres debenture holders, excepting sub-section *d* of the second resolution, which read:

(*d*) The Primitiva Company to be at liberty to create a floating charge on its undertaking (ranking *pari passu* with the floating charge to be given as above mentioned) to secure the £250,000 debenture stock of the Buenos Ayres (New) Gas Company, with a cumulative sinking fund of 1 per cent. per annum for redemption of the same.

A further resolution was passed, modifying certain sections of the deed of Nov. 3, 1897.

A cordial vote of thanks to the Chairman and Directors terminated the proceedings.

River Plate Shareholders' Meeting.

An Extraordinary General Meeting of the Shareholders in the River Plate Gas Company, Limited, was subsequently held, Mr. BOWEN again presiding.

The CHAIRMAN again went over the history of the troubles with the Municipality of Buenos Ayres, and of the proceedings leading up to amalgamation, in connection with which, he subsequently said, they were all very thankful indeed to their representatives in Buenos Ayres (Messrs. Woodgate, Gabarret and Rowbotham), for the immense amount of labour and skill they had given to the work. They also owed a great deal to the hard work and popularity of Mr. S. Hale Pearson, of the Primitiva Company, who, of course, was the immediate negotiator. The idea at the base of amalgamation was to give each Company, more or less, the same dividend that had been received—indeed, if the receipts kept up to their present level, of which there was little doubt—the shareholders should get a little more than they had had for the last few years. Before the amalgamation became known, the Company's shares stood at about £13 to £14, and they had since advanced to £16 or £17; so evidently the market thought that a good business had been done for the shareholders. He did not wish to say for one moment that the Company had obtained any undue advantage; but he thought he might safely say that the *ad referendum* deal they had made was an absolutely fair one for all parties concerned. The proposal was to give, for each £10 share, £10 in 5 per cent. cumulative preference shares of the Primitiva Company, and one £5 ordinary share. Some of the shareholders, no doubt, would ask why they, the largest of the three Companies, could not absorb the others. But their machinery would not allow of their benefiting the shareholders by increasing their nominal holding, and the Primitiva Company was the only one of the three which was in the position to make anything like a fair deal with the Municipality. He believed all would agree with him when he said that the River Plate Company had been a very successful one. He remembered, when he made the amalgamation of the Argentine Gas Company with the Belgrano Gas Company, in 1896, many people thought and said that the new Company—the present one—was over-capitalized. He knew that was not the case; and his opinion had been proved, by the results year after year, to be correct up to the hilt, and by the very favourable position in which they found themselves, for negotiating the business which the shareholders were now asked to approve. He said now, as he said in 1896, that, in his opinion, the new Company would not be over-capitalized; and given the same conditions which had obtained in the gas industry in Buenos Ayres during his long connection with it, he was certain the shareholders could look forward to the same prosperity and the same good dividends that they had enjoyed during the last twelve years. He was the largest holder of ordinary shares in the Company; and he always thought that what suited him must suit his constituents. He might add that he had not bought or sold a share of the Company for many years. The Directors would join the Board of the Primitiva Company; the Manager in Buenos Ayres would continue in the management of the combined Company; and, if he might refer to a personal matter, he would add that the Joint Board had done him the honour to ask him to be Chairman of the combination. Although he was very loth indeed to add to his responsibilities, he had felt it incumbent upon him to accept the invitation. The shareholders had all been very good to him during the thirteen years he had presided over the Company; and he felt he owed it to them to see that their interests were thoroughly protected—though, in any case, they would be by the new Board, even if he were not upon it. They had not yet fully decided which of the officers of the old Companies would be retained, and, of course, some of them would have to go, because, in order to cope with the reduced selling prices of gas stipulated for in the contract, everything possible to effect economies would have to be done. There was no doubt these economies would be very considerable, as they would only have two works instead of the present four—it being their intention to suppress the Belgrano works. Any officers they had to dispense with would, of course, be properly compensated by the new Company. The contract was a definite and legal one; and it lasted for twenty years, which was about as long as they need look forward to.

The CHAIRMAN, replying to a question, said the contract entered into fixed the price of gas for twenty years.

On the proposition of the CHAIRMAN, seconded by Mr. OGILVIE, resolutions were passed approving of the provisional agreement made between the Company and the Primitiva Company for the sale of the Company's undertaking, subject to its debenture stock for shares in the Primitiva Company; agreeing to wind up the Company voluntarily; appointing Mr. A. E. Bowen and Mr. J. Murray Tulloch as Liquidators; and conferring upon them the necessary powers.

On the motion of Mr. H. E. JONES, a hearty vote of thanks was passed to the Chairman and Directors—the proposer, speaking from personal knowledge, bearing testimony to the arduous and anxious times through which the Board had been passing.

Meeting of the Primitiva Gas and Electric Lighting Company, Limited.

The last Meeting was an extraordinary one of the shareholders of the above Company—Mr. H. E. JONES presiding.

The CHAIRMAN, in the course of his remarks, said that those shareholders who had attended the annual meetings of the Company would be aware that for some long time past he had thrown out intimations that, from the point of view of the Primitiva Directors, the amalgamation of the interests of the three Gas Companies supplying Buenos Ayres was of the very first importance, and that his Board were anxious to, at any time, enter into negotiations for the purpose. The necessity for amalgamation became accentuated very much by the pressure put upon the Companies by the Municipality for reducing the price of gas. At one time this became so acute—that was, in 1906—that the Municipality actually suggested and passed an ordenanza, having the effect of reducing the price by such a large proportion that he was not exaggerating when he said that it would have resulted in great injury to the dividends. At that time, various propositions were considered, one of which he was glad to say now did not go through—that was, for the amortization of the shareholders' interests, and handing over to the Municipality the whole of the undertaking at the end of fifty years. Subsequently there came an opportunity for the negotiation of terms ending in the agreement now before the shareholders. He did not hesitate to tell the shareholders that these terms were very hard; but they were the best obtainable. The Company had never had the position of an English Gas Company as confirmed by Act of Parliament, or even of a Continental Company, as confirmed by a concession continuing (say) thirty or forty years under express conditions. They were trading in Buenos Ayres more or less as ordinary traders at their own risk, although they might have resisted in the High Courts any determination to carry out any ordenanza such as he had referred to. But it would have been costly and anxious litigation. The terms now made, hard as they were, could be met, and, he thought, met without injury to the shareholders' interests, if they could effect the economies that, on considering the matter, were easily appreciated. They had seen amalgamations of great gas companies in London, and the ensuing beneficial effects. In the negotiations that were carried on in Buenos Ayres, their Local Manager (Mr. Hale Pearson) was careful to make a point of the condition that the amalgamation should be adopted by the Municipality. How much they were indebted to Mr. Pearson he could hardly describe, because the negotiations had been going on now for two or three years. It so happened that their Company were able to accept a suggestion from the Municipality which eased the way to their getting the terms that had been secured, and even a modification in their favour to a very important extent. The Chairman then referred to the question of the site of the Company's works being required, as explained in the report of the proceedings at the meeting of the Buenos Ayres debenture holders. This, he remarked, put the Company in a better position for negotiating and making terms. He was bound to say that, as soon as the terms were ascertained, Mr. Bowen, the Chairman of the River Plate Company, in the frankest and fullest manner, expressed his view that the amalgamation was necessary for the safety and economy of the future supply. From Mr. Bowen's declaration in that way, the matter went forward very rapidly. Reference was next made by the Chairman to some of the difficulties, and to how they were composed. One of the factors that rendered amalgamation necessary was that, if the Company handed over their land, they would have to provide for the making of gas elsewhere; and within the period allotted, it was quite impossible to find a fresh site and erect upon it new works. So that the gas hitherto made at their works would in future be produced upon the spare land at the works now possessed by the other two Companies, and a large part of the plant at the Primitiva Company's Retiro works would be transferred to the works of the other Companies. Such was the progress now in Argentina, and such the sale of gas in Buenos Ayres, that they would have to make provision for the future. It would be seen in the scheme of capital that they were providing for an amount greater than was necessary for the shares of the two other Companies; but the excess money would only be spent as the demands for gas increased in Buenos Ayres, and so necessitated the expenditure. Looking at the amalgamation from the technical point of view of a gas engineer, he saw nothing but advantage in it. Before concluding, he praised the work of his colleague, Mr. Sanford (who is a large shareholder), and who had taken a prominent part in working out the financial side of the amalgamation scheme.

There was a little discussion of details of the scheme by Mr. Humphreys, to which the Chairman replied. One interesting matter alluded to was as to what the Company were to receive for the land they were surrendering. The Chairman replied that they got power to charge an additional 6d. per 1000 cubic feet of gas for twenty years as compensation. They considered this was sufficient compensation.

With regard to the reduction of the price of gas, that had been considerable. They used to charge 24 c. per metre, with a tax of 2 c. They were now going to charge 21 c., with a tax of 10 per cent., which was a little in their favour. Taking these figures together, it worked out that, whereas they used to get about 11s. per 1000 cubic feet, they would now receive rather less than 10s. net, after allowing for the tax. But they looked to obtaining an increase in business by the adoption of the use of gas in many directions.

Proposed by the CHAIRMAN, and seconded by Mr. W. W. PHIPPS, resolutions were passed to the following effect: (1) Confirming agreements. (2) Authorizing the Directors to give a floating charge upon the Company's undertaking (subject only to the existing charge securing £558,100 first debentures of the Company) in favour of the holders of £350,000 4 per cent. debenture stock of the River Plate Company, and £250,000 4 per cent. debenture stock of the Buenos Ayres Company, and to undertake the obligations of these Companies under the deeds securing their respective debenture stocks, and to provide a cumulative sinking fund of 1 per cent. per annum upon each of the amounts of £350,000 and £250,000 for the redemption of the debenture stocks at 105 per cent. and 102½ per cent. respectively, with power to apply the sinking fund by purchase in the market below such figures respectively.

A special resolution was—"That the capital of the Company be increased to £4,000,000 by the creation of an additional 340,000 5 per cent. cumulative preference shares of £5 each, ranking *pari passu* with the existing preference shares of the Company, except that such new shares shall not be entitled to participate in any dividend that may be declared in respect of the financial year of the Company ending Dec. 31, 1909, and 220,000 ordinary shares of £5 each, ranking *pari passu* with the existing ordinary shares of the Company, except that such new shares shall not be entitled to participate in any dividend that may be declared in respect of the financial year of the Company ending Dec. 31, 1909, and that the Board be authorized to issue the said shares or any of them upon such terms at such times and carrying dividends from such dates as the said agreements may require or as the Board may think fit."

Various alterations in the Articles of Association were also agreed to.

The CHAIRMAN later referred to the remarkable manner in which the stocks of the three Companies had appreciated since the rumour got afloat as to the amalgamation. The increase amounted to a considerable one all round—practically an increase of 20 per cent. on the three Companies. He thought this was very satisfactory.

On the motion of Mr. HUMPHREYS, a cordial vote of thanks was passed to the Chairman and the Directors.

BRITISH COALITE COMPANY, LIMITED.

The Ordinary General Meeting of this Company was held last Tuesday, at Salisbury House, E.C., under the presidency of Sir W. H. PREECE, K.C.B., F.R.S., the Chairman. There was a very large attendance of proprietors.

The SECRETARY (Mr. A. Phillips) having read the notice convening the meeting, and the Auditors' report,

The CHAIRMAN addressed the shareholders at length. In the course of his speech, he said that the unpaid calls by Coalite Limited would be liquidated early next year. From the general expenditure and sundry receipts statement during experimental development and constructional period, it seemed as though a loss had been made on sales of coalite and bye-products. It was not, however, a profit and loss account; it was simply an expenditure for experimental and construction purposes. In established industrial concerns, expenditure of this nature was usually met by a reserve account for experimental work. Owing to their distilleries not being in full working order, they had not been able to take credit for the real value of their tar; and until their arrangements were finally completed for the utilization of the gas made, they were prevented from crediting themselves with the full benefit to be derived from this bye-product. The position, if looked at fairly and dispassionately, was not unfavourable. They had spent £153,000 upon buildings and machinery, which had commenced to earn a living. The other assets in land and patent rights more than covered the commitments and responsibilities. They had plenty of cash in hand to complete their programme—and especially to carry out the work in hand at Barking, which would directly supply coalite to the Metropolitan area. They had £171,000 still due from calls in arrear; and they had not had to borrow one single penny.

POSITION AND PROSPECTS.

He would explain the present position and prospects of the Company. It was, of course, disappointing to appear before the shareholders with negative cash results; but theirs was a new industry, based on novel scientific principles, demanding considerable experiment and much practical detail—operations that occupied time and required great care and caution. Since the meeting a year ago, the continuous working of the process, and the accumulated experience thereby gained, had satisfied him and everyone on the Board that the Company were on absolutely safe ground, and that a great future awaited them, not only from a scientific, but also from a commercial, point of view. They had spent two busy years in developing their industry. They had made mistakes. It had not always been a clear course; but there had never been anything approaching disaster or exciting fear. No difficulty had arisen that had not been easily surmounted. The difficulties had been mechanical; and there had been none fundamental or disheartening. Their effect had been only delay. It would have been better on their part if they had not started four works simultaneously, before determining the standard patterns of stills, settings, conveyors, and furnaces, for it meant quadrupling the cost of improvements. This was one reason why they delayed the progress of the large works at Barking—a delay that was answerable for many wild conjectures in the minds of those who desired disaster. They had now turned the corner, and were about to enter the profit-making stage. The pioneer work always awaiting those who attempted to found a new industry had been accomplished. They had had to rely upon themselves for everything, and for every step in advance that had been taken. They might say, without fear of contradiction, that they owed nothing to any other section of the industrial world for their advancement. This was what had had to be done: (1) To take in hand the erection and running of a large foundry for the manufacture of the patented coalite plant. (2) To erect tar-distilleries for the refining of the tar, and other bye-product plants. (3) To design and standardize every detail of plant, and to negotiate with existing gas-making concerns for its introduction into their works—since the Company could not supply their gas direct to the public in any area in which an existing gas company had statutory rights. These were a few of the pioneering labours which had faced the Board; and the work had entailed no small amount of worry for Directors and management alike. They had had to push their way to the front against tremendous odds; and though the energy of the staff had effected much, their work—strenuous as it had been—would have been entirely unavailing, were it not that it was based on scientifically and commercially solid ground. The Board had had the great satisfaction of finding their proposals and results verified to the letter by the leading Continental experts sent over to examine the process and figures. No one had found a flaw in the processes, nor expressed a doubt of the accuracy of the estimates. Dr. Knublauch, the leading expert on gas and tar in Germany, was sent over to inquire into the working, and everything was placed unreservedly at his disposal. He spent three weeks in Wednesfield, personally testing and examining everything; and his report was most satisfactory. It not only verified all their own conclusions, but it went "one better." It was not from coalite alone that they hoped to earn dividends. It was also from the rich tar—the richest tar ever produced—from which coaline (so valuable for motors), rubber solvents, tar acids for disinfectants and for wood preservation, bitumen of very high electrical qualities, and other valuable products, were derived. Sulphate of ammonia for fertilizing was also manufactured; and all these had valuable markets open to them.

ONE OF THE CHIEF ASSETS—GAS.

One of their chief assets, however, was gas, which could be, and was being, used by gas-works to augment the supply of their ordinary coal gas, and which they were using themselves in Wednesfield for power purposes. They could offer to supply gas companies with gas into their holders at 25 per cent. less than the price they could produce it themselves. It was very satisfactory to find that the gas interest—so inimical to the Company's birth—had recognized that there was something in the process, and were now looking more kindly on the proposals. The Board were at present negotiating with several very important companies in different parts of England for the erection of coalite plants. The coalite process in no way competed with the gas companies; but it was a very valuable auxiliary for enabling them to improve the value and quality of their gas, and to lower their prices. The satisfactory contracts made with the Gas Companies at Plymouth and at Hythe were being carried out. The plants in both places were giving steady returns. The gas was rich in illuminating power; and there was a great demand for coalite in both neighbourhoods—in fact, there was a large accumulation of orders. The tar produced was dealt with by the Coalite Company, and would in future be shipped to the central distillery at Barking for distillation. They would be able to produce at Barking sufficient gas to develop power, and hoped to supply local consumers with gas for the enrichment of their own gas. The Company would have a large power station erected, which would enable power to be supplied at a price cheaper than that charged anywhere in Europe. Niagara even could not touch them in price. There was thus an excellent market for the gas when converted into power. Within a month from now, they would be making about 1,000,000 cubic feet of gas per day at the Barking works alone, to be shortly increased to 3,000,000 cubic feet; and this gas could be treated in the same way as the gas at Wednesfield—converted, by means of huge gas-engines and dynamos, into electrical power. They had over 300 acres of freehold land at Barking available for their works—electro-chemical and mechanical—and they had a river frontage of a mile. Works could be erected on this land and receive either gas or power from the Company without any legislative restrictions. The process had a national and a hygienic value; for coalite was *par excellence* a smokeless fuel. As regarded the patents, they were in an impregnable position. Patents had been granted in 38 foreign countries and British Colonies and dependencies. Every foreign expert who had investigated the process acknowledged the essential novelty of the claims. Mr. Kitching, Sir A. Cory-Wright, and Mr. Pugh had retired from the Board, and Mr. Parker had joined it. He concluded by moving the adoption of the report and accounts.

Mr. THOMAS PARKER, J.P., seconded the resolution.

A VISIT TO WORKS.

Mr. JAGO said some months ago he made an application to the Company asking for permission to see some of the Company's works in progress. This was granted readily; and he had made a visit alone to Plymouth, and spent some considerable time inspecting the works of the Company there. He had also interviewed to his heart's content the Gas Manager and the authorities of the Company. He had seen the coalite plant in operation, working perfectly smoothly and regularly, and affording no difficulties whatever, but steadily supplying large quantities of gas of 20 or 21 candle power into the holders of the Gas Company. With regard to the coalite made by the Company, it was bought up at prices quite as high as the best coal, as soon as it was made. Indeed, it might have been disposed of several times over. So far as the tar was concerned, they were not handling it at Plymouth; and he understood that the tar question would be dealt with by the Company themselves at Barking. He had gone very carefully into the question of the terms on which the Plymouth Gas Company had the coalite plant erected; and it seemed to him that from the Gas Company's point of view only this was a bargain which would not fail to be of the utmost advantage. Bearing this fact in mind, one was mystified at not finding that an offer of this kind, made by a Company having a substantial backing, such as the Coalite Company had, had not been more widely considered and adopted by gas companies generally. It had also occurred to him that this was one way in which they as shareholders might do something very material in the way of improving the value of their own property. It was possible that many of them had

among managers of gas companies, boards of gas companies, and shareholders of gas companies, some personal friends; and thus one way in which they might do yeoman service to the Company was by telling these friends that this offer was still open to all gas companies. By this means they might be assisting the British Coalite Company in finding an outlet for their gas. He had also taken an opportunity of visiting the works at Wednesfield. Here one saw coalite under totally different auspices. The parent Company had first of all established a foundry which was now turning out retorts and other appliances necessary for the manufacture of coalite and gas, all to a standard pattern. The coalite manufactured there was also sold as rapidly as it could be made. The tar was being worked into various residual products. What was of more particular interest to him was the question of the use of the gas which was being produced at Wednesfield. It was being used by the Company partly for the heating of their own furnaces; the surplus was employed generating electrical power by the ordinary methods of gas-engines and dynamos.

Questions and Answers.

General Miller asked why difficulty was experienced in making coalite, for which there appeared to be such a great demand. People who wanted a clean fuel were using carbo, because they were unable to get coalite.

Mr. Broomhead said he had visited the works at Wednesfield. He went there prejudiced, but came away quite satisfied. He took many samples, and made many investigations and tests. He removed the samples to an independent laboratory in London; and as the result of an article which he subsequently wrote, many of the large firms who used such bye-products were interested, and asked if they could see the coalite bye-products. He showed them to the chief chemists and managing-directors of several undertakings, who expressed the opinion that they had never seen bye-products of such superior quality. They mentioned the prices they were willing to give for them; and these were much higher than those they were giving for the ordinary gas products. With the completion of the tar distillery at Barking, they would be in a position to supply the bye-products, and he believed that the Company would thereby realize enormous profits.

Mr. Gideon wished to know why carbo was allowed to be made, if it was so much like coalite. Moreover, if carbo could be supplied, why could not coalite?

Mr. Janau said that after a fortnight's use of coalite, he came to the conclusion that unless he was compelled he would not burn coal again. He had experienced considerable difficulty in keeping to this resolve; but he had done so by ordering his supply some weeks ahead of his requirements. There were several things which had pleased him in the use of coalite. It burned without smoke; it did not give forth sulphur fumes; it was light to carry, and cleanly to use. He had on two or three occasions, however, reported to the Secretary the stony character of the coalite supplied to him; and he was glad to say that since then this defect had been to a great extent removed. He had one suggestion to offer—that the Directors should publish the relative heating power of coalite, coal, and coke; and in this connection he wished to inquire whether there had been any change in the heating power of coalite since it was first introduced.

Sir Annesley de Renzy said he had been using coalite for some years; and so far from noticing any deterioration in its heating power, his impression was that it was as good to-day as ever. He could speak with entire approval of coalite. Some time ago he noticed the tendency to issue splinters; but he was glad to say that this had practically disappeared within the last six or eight months.

Mr. Richardson desired to know if a profit was being made at Plymouth.

Mr. Dewar said he had visited Wednesfield and seen the plant at work; and he came away impressed by the fact that there was a great future before coalite—given proper and economic handling.

The Chairman, in reply, said he was glad to hear the remarks made by Mr. Jago; and he could not help wishing that many more shareholders would apply for permission to visit the works. They would thus gain a great deal of knowledge as to the proceedings of the Company, and the reasons for the delay which had taken place. Of their 3500 shareholders, not 1 per cent. had shown a personal interest in the active proceedings of the Company. The question of carbo had been raised, and the ease with which it could be obtained; but this carbo was only sold by the largest Gas Company in the United Kingdom, who had spent millions of capital and were simply, with their existing plant, able to obtain something that was not very unlike coalite when burned as a fuel, but which was infinitely inferior. The Directors of the Company did not know what their fuel cost to produce. The Board were very glad that carbo was in the market. It was creating an appetite for smokeless fuel; it was creating an appetite for something which the Company would be able to supply of a very much better quality. As to the difficulty of supplying coalite, it must not be forgotten that they had not done as others had done; they had not spent their capital. As they saw little difficulties arising, they conserved their capital. But, as he had already stated, they had now turned the corner, and were commencing to pay. They were going on regardless of the attempt to rush them. They were going to do their duty; and they were doing it with their eyes open. They knew what they were about, and were perfectly certain they would succeed. They were going ahead slowly, and were now turning out over 400 tons a day. They had demands for quite 4000 tons a day. With regard to the question of heating power, there was no doubt that there had been considerable variation in the quality of the coalite manufactured; but this was due quite as much to the difference in the quality of the coal as to the difference in the mode of carbonizing it at the various works. They were gradually finding out all these defects. He was asked if they were making a profit at Plymouth; but the fact was they had not yet made a profit and loss account in connection with any of the works.

The motion was then put, and carried with one dissentient.

The re-election of the retiring Directors and the Auditors, and a vote of thanks to the Chairman brought the proceedings to a close.

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PRESENTATION TO MR. T. PALIN, OF DONNINGTON.

A meeting of the staff and workmen of Messrs. C. & W. Walker, Limited, of Donnington, Salop, was held on the 17th inst., for the purpose of presenting an illuminated address and a purse of gold to Mr. Thomas Palin, on his retirement from the position of Works Manager. Mr. R. J. Milbourne, who presided, said they had met for the purpose of presenting an old friend and comrade with a small token of their esteem and regard. Mr. Palin entered the service of the firm in his early boyhood days, and had established a record of fifty-one years, which few of those present could hope to reach or surpass. During the whole of the time that Mr. Palin had been engaged at the Midland Iron-Works he had always been ready with a kind word and helping hand in any movement for the benefit of those who were associated with him in business. He was sure he expressed the wish of all present, as well as of all absent friends, that Mr. Palin might have very many years of health and happiness before him. He asked Mr. Hugh F. Wright to make the presentation. In complying with the request, Mr. Wright expressed his great pleasure in doing so. He said that, as one of the youngest members of the staff, he felt it an honour to speed the oldest member on his way to a well-earned rest after so lengthy and creditable a term of service with the firm. He hoped Mr. Palin would be spared many years, and that health and happiness would be his constant companions. On behalf of the subscribers, he had pleasure in presenting Mr. Palin with the address and purse of gold. The address was worded as follows :—

> To Thomas Palin, Esq. Dear Sir,—On your retirement from the post of Works Manager, after a period of 51 years' faithful service, we, the undersigned, on behalf of the staff and workmen of C. and W. Walker, Limited, Donnington, Salop, desire to place on record our regret at your departure, and our appreciation of your ability and energy, which have contributed in no small degree to the growth and prosperity of the Midland Iron-Works. The impartial manner in which you have always discharged the duties of your office has commanded the respect of all who have worked with you. In asking your acceptance of the accompanying purse of gold, as a small token of our esteem and regard, we assure you that all who have had the pleasure of association with you in business earnestly hope that you may be blessed with long life, good health, and true happiness in the enjoyment of the rest that you have so well earned.—We are, Dear Sir, yours faithfully, Hugh F. Wright, B. Franks, J. Bachelor, W. Clarke, H. Teague, T. Mansell, W. Weaver, E. Howell, W. Pownall, W. Chaffer, R. J. Milbourne, J. Monk, J. Franks, R. Hill, C. S. Smith, J. Vaughan, William Jones, H. W. Tranter. Donnington, Salop, December, 1909.

The address was most beautifully illuminated, and mounted in an English gold frame. In responding, Mr. Palin thanked the donors one and all for their very generous and whole-hearted gift, and for the kind feeling that prompted it. The beautiful testimonial would enable him to recall the friends of his earlier days as well as the newer friends who had always stood by him in all matters connected with the prosperity of the firm. Looking back to the time when he was invited by the previous owner of the Midland Iron-Works—Mr. C. C. Walker—to take command with the crude machinery they had in those days to work with, and the many devices they had to construct in order to do the different work, and compared them with the methods, tools, and machinery they now had at Donnington, it made him wonder how the work used to be got through. He was just 22 years of age when he was first appointed foreman at Donnington in the boiler shop, with a matter of fifty men and boys under him ; and in a few years the number increased to 150. To say there was no uphill work then would be untrue; but by perseverance and hard work they managed to pull through. As time went on, by increasing and adding to the works, they were built up to the magnificent establishment they had to-day. During all this time he had the united assistance of the heads of all departments, as well as the whole of the workmen ; and it was because of this that he felt the parting most. He could not forget to tender his thanks to the Directors for their generosity to him at the close of his career. In conclusion, he expressed his heartfelt gratitude to all for their self-sacrifice and good wishes. His chief desire was that the Midland Iron-Works might long continue to flourish and prosper, finding good employment for the many workmen there, and be a source of prosperity to all the surrounding neighbourhood. Three cheers were called for Mr. and Mrs. Palin, and given with musical honours.

Serious Charge against a Gas-Works Clerk.—George Hepworth, a young man until recently employed as accounting clerk at the gas-works of the Pontefract Corporation, for whose arrest on a charge of embezzlement a warrant was issued about a month ago, surrendered to the police at Pontefract on the 19th inst., and next day was brought before the Magistrates at the Town Hall. Mr. Harold Kaberry, the Assistant Town Clerk, asked for a remand for fourteen days—there not having been sufficient time since prisoner's arrest to complete the case against him. Mr. J. R. Green, on prisoner's behalf, asked for bail. He pointed out that prisoner had hitherto borne an excellent character, as did his father. The Bench ordered the remand, and agreed to accept bail—the accused in £25, with one surety of a like amount.

Incandescent Gas Lighting in Bloomsbury.—The Holborn Borough Council, at their meeting on Wednesday, adopted a report presented by the Works Committee with regard to the lighting of the new street from Torrington Square to Montague Place. The report set out that, owing to the great width of the street, it was necessary that the lamps should be more powerful and of a greater height than those in streets of the average width. The Committee had come to the conclusion that it was necessary to have the standards at least 16 feet high and about 65 feet apart. The total number required was 16 ; and the Committee proposed that 10 should have double and six single lanterns, so arranged that there should be a double lantern and a single lantern alternately, and double lanterns at the intersection of the side streets. Inverted incandescent burners will be fitted to the lamps.

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222

MUNICIPAL SUPERANNUATION.

A Suggested System.

At a Meeting of the Institution of Municipal Engineers held at Caxton Hall, Westminster, Mr. JOHN T. PEGGE, the City Engineer and Surveyor of Durham (and President of the Institution), read a paper on the subject of "Municipal Superannuation," of which the following are the main portions.

The passing of the Workmen's Compensation and Employers' Liability Acts has definitely affected the relationship between all authorities exercising powers of municipal government and their workpeople and officers alike; and, accordingly, most authorities have had to insure against the liabilities thrust upon them by these Acts. The conditions laid down are such that frauds may be practised by the employee or injustice done to the poorer worker by the authority, with the public purse behind it. At any rate, it seems to me that some extension of the above Acts is necessary by simplifying them and making them the basis of a system: (1) Of provision against sickness while in employment. (2) Of pension in cases of incapacitation while performing duty. (3) Of superannuation on attaining a certain age (being the completion of a life's duty, faithfully and well performed). (4) Of a bonus to dependants if life is cut short, due to performance of duty. This may seem a "tall order;" but by means of deductions from pay and a slightly lower wage at commencement, the cost to the rates need not be so serious as at first sight it seems—very probably not more than the premiums paid under the Acts already in force.

Of course, in any scheme provision should be made for an employee's continuance of service from one authority to another (with a minimum of service in each case counting for pension, as in the police force). This system would have to be national, with a registrar at headquarters to allocate to the various authorities their proportions under an all-round rate. A similar system works well with the police service; and the financial adjustments are by no means insuperable. The inauguration of a system of pensions should have some greater influence than that arising merely from the monetary point of view. A scheme such as would be most desirable would do away with a somewhat general custom where, after a man has served a ratepayer until overtaken by old age, he is quietly ousted by the younger and more vigorous man in the procession of life, and may then next be found in the ranks of municipal employees—being put there by the great influence always at work in local self-government. Still, it will be asked, as a matter of course, What do you want?

My suggested system is that the employee should begin at (say) twenty-one years of age and continue in municipal service until sixty-five years of age; and that all posts in the chosen branch of work should be open to the qualified and deserving, free from the trammels of Trade Unionism. This would ensure all employees being properly trained to their work; and as a consequence the ratepayers would gain in effectiveness, and thereby in economy of work, the little extra they might (on paper) be called upon to pay.

The following is an outline scheme, which, no doubt, needs a financial expert to revise as to rates and terms; but the principle of the thing is what I suggest:—

(*a*) Full-wage during certified illness up to sixty-five years.
(*b*) Half-wage during life after sixty-five, unless previously retired.
(*c*) Half-a-year's wages at death, paid to the legal dependants.

To provide this, take as a basis—other wages being *pro ratâ*. A man starting at twenty-one years old, paying 12¾d. per week per pound of wage, would be entitled to the benefits named. Now, a deduction of 4 per cent., or 9·6d. in the pound, from the weekly wages, and a contribution from the authority of 3·2d. in the pound, or 1⅓ per cent., would be a fair allocation of the cost; and in considering this statement, the increments of salary occurring at intervals nearer the time of retirement would have to be taken into account. I would not be inclined to suggest the payment of pension except to those officials and workers solely and permanently engaged in the municipal services. I favour a scheme like the one suggested as being less of a tax on the ratepayers. Assuming that the average cost of all salaries and wages paid by local authorities, including all departments, be 3s. 6d. in the pound per annum, the increase would be barely equal to ½d. in the pound rate beyond the present insurances. A system such as this would conduce to a very reasonable form of security of tenure, because a council would only then newly appoint men of twenty-one years or under, as, if they newly appointed a man of thirty-one years, the total contribution per pound of wage would be 1s. 6½d., or at (say) forty-one years, 2s. 5d.

We are not attempting any innovation, as the following cases will show: The police service is premiated (as should be all other public services with fixed rates of pay). Their system is a maximum and minimum one. The general and maximum one is on completion of fifteen but under twenty-one years' service, one fiftieth of the pay for every completed year; twenty-one to twenty-five years, two fiftieths of the pay for each year; and an addition of one twenty-fifth for every completed year above twenty years. If twenty-five years' service, further additions for every completed year—the pension not to exceed two-thirds of the last annual pay. The whole of this pension fund is provided by the rates. It is quite true that the police run serious risks, and have night duty to perform; but special conditions are laid down as to compensation in case of disablement, and pensions to widows and children if their breadwinners are killed while on duty. The Army pension after twenty-one years' service ranges in the ranks from sergeant-major at 2s. 6d. a day to a private at 1s. 1d.; and in paying what is apparently a labourer's wage of about £1 a week to a sergeant, it must not be lost sight of that to this has to be added clothing, housing, food, medical attendance, travelling expenses, &c., making this service fairly well pensioned after some eighteen years' work, for which no contribution is levied. Again, in the whole of the forty-one departments of the Government service, under the new rules, the pension is looked upon as deferred pay, and no contribution is levied. In system,

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it is simplicity itself. Each employee may retire at sixty, the higher officials at sixty-five, when one full year's pay is given on retirement, and half-pay continued till death. Many big municipalities have such a system, which has been approved by the Local Government Board. Of course, there are differences in *minutiæ;* and in most cases these apply only to corporation officers and chiefs of departments, and not to the workpeople. I do not think this is fair to the humbler and no less conscientious worker; but that, of course, is only a matter of opinion.

One system I will quote: Three per cent. of the salary or wages is to be deducted, and the interest thereof added *pro ráta* to the credit of the officer contributing, who, after serving for twenty-five years, and being not less than sixty, shall be entitled to a pension equal to half-salary, with an additional two-fifteenths of his salary for each year after twenty-five years' service, but not to exceed two-thirds of his last year's salary. If he has served fifteen, and less than twenty-five, years, and has become incapacitated while in the performance of his duties, he shall be entitled to a pension of fifteen-fiftieths of his salary, with an added one-fiftieth of his salary up to twenty-five years, and over the twenty-five years shall be entitled to the full rates. In case of leaving or death before becoming entitled to a pension, the whole of the amount (*plus* interest) standing to his credit is returnable to him or his representatives; and even if he dies after having qualified for, and taken, a pension, if the sum paid does not total 75 per cent. of the amount to his credit, a money payment may be made to his widow or children. Of course, special powers are reserved to grant contributions to a lesser degree according to circumstances. Any deficiency in the fund is to be made good by the authority. This, of course, is a necessary provision; but I have not yet been able to get further details as to the rate necessary for the working of such a system.

By an Act of Parliament, 1896, it is provided that "every officer and servant of guardians of a union or parish (1) becoming permanently infirm, (2) attaining the age of sixty and having completed forty years' service, (3) or attaining the full age of sixty-five, shall be pensioned as follows: There must be a full ten years of service to qualify. This entitles him or her to ten-sixtieths of the average of the last five years' wages, with an addition of one-sixtieth of such average for every completed year until the completion of forty years' service, when a maximum allowance of two-thirds average salary or wages is granted.

In addition to the pensions granted to the afore-mentioned public employees, the great bankers and other high financial companies apply systems of pensions to their employees.

It was stated in the course of an inquest at Chester on the body of a woman who was found suffocated by gas, that the tap to the bracket was very loose; and it was quite possible that deceased, in turning the gas out, had turned the tap on again accidentally. At any rate, when the body was discovered the room was full of gas, and the tap was on, but not lighted.

CURRENT SALES OF GAS PRODUCTS.

Sulphate of Ammonia. LIVERPOOL, *Dec.* 23.

All supplies continue to be readily taken up as they become available, although the bulk of the buyirg is for the purpose of executing contracts made previously for December shipment, and new direct orders are rather scarce. There has been no further advance, but values are well maintained at £11 6s. 3d. to £11 7s. 6d. per ton f.o.b. Hull, and at £11 8s. 9d. to £11 10s. per ton f.o.b. Liverpool and Leith. For delivery in the first half of next year, another first-hand sale is reported at £11 10s. per ton f.o.b. Leith; but most makers refuse to trade at less than £11 12s. 6d. per ton, and buyers prefer waiting to paying the latter figure.

Nitrate of Soda.

The position of this article is unaltered; the tone of the market continuing quiet, but holders declining to reduce their price below 9s. 3d. per cwt. for 95 per cent. quality and 9s. 6d. for refined, on spot.

Tar Products. LONDON, *Dec.* 24.

Owing to the holidays, business all round has been very quiet during the past week; and as many of the works will be closed a good part of next week, very little will probably be done until after the New Year. Pitch is still very firm, with a tendency to advance in price, and a fair disposition on the part of consumers on the Continent to meet the market. Creosote is quiet and prices low, although large quantities are still being shipped. Benzols are steady; and toluol is scarce. Solvent naphtha is in good demand, with makers unwilling to commit themselves further. Carbolic acid is weak; and crystals are very difficult to sell. Naphthalene is dull; but salts are in demand. Tar is fetching good prices in nearly all quarters.

The average values during the week were: Tar, 13s. 6d. to 17s. 6d., *ex* works. Pitch, London, 27s. 3d. to 27s. 9d.; east coast, 27s. to 27s. 6d.; west coast, 26s. 6d. to 27s. 6d. f.a.s., 27s. 6d. f.o.b. Benzol, 90 per cent., casks included, London, 6⅞d. to 7d.; North, 6d. to 6¼d.; 50-90 per cent., casks included, London, 7⅜d.; North, 6⅞d. Toluol, casks included, London, 9⅜d. to 10d.; North, 9d. to 9¼d. Crude naphtha, in bulk, London, 4d. to 4¼d.; North, 3⅞d. to 4d.; solvent naphtha, casks included, London, 1s. 1d. to 1s. 1½d.; North, 11½d. to 1s.; heavy naphtha, casks included, London, 10⅜d. to 11⅜d.; North, 10d. to 10½d. Creosote, in bulk, London, 2½d. to 2⅝d.; North, 2⅛d. to 2¼d. Heavy oils, in bulk, 2⅝d. Carbolic acid, 60 per cent., casks included, east coast, 10⅜d.; west coast, 10⅜d. Refined naphthalene, £4 10s. to £8 10s.; salts, 40s., packages included and f.o.b. Anthracene, "A" quality, 1⅛d. to 1⅜d. per unit, packages included and delivered.

Sulphate of Ammonia.

The market for this article has been very firm throughout the past week, with prices hardening all round; and some of the dealers appear

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to be decidedly short for near delivery. In London, the principal Gas Companies quote £11 8s. 9d. to £11 10s. for prompt, and £11 12s. 6d. for January-June. In Hull, best makes have been sold at £11 7s. 6d.; and in Liverpool at the same figure. In Leith, £11 10s. is quoted for prompt, and £11 12s. 6d. to £11 15s. for forward; but for the former, the makers are practically out of the market.

COAL TRADE REPORTS.

Northern Coal Trade.

The Northern coal trade has been very active; but stormy weather has interfered with the regular arrival of some steamers, so that the shipments have been rather irregular. The steam coal trade has shown a little ease, partly on this account and partly because the uncertainty as to the working of the mines under the new Act has been removed by the agreement between the coalowners and miners. Best Northumbrian steams are now about 11s. per ton f.o.b., second-class steams about 10s., and steam smalls from 5s. 3d. to 6s. 6d. The output is now expected to be limited for a week or so. In the gas coal trade, the demand is at its fullest, and the shipments have so far been stimulated by a full production at the mines; so that the deliveries on the long contracts have been heavy. Prices have been very firm, more especially for forward delivery. For the usual classes the quotations have been from 9s. 6d. to 11s. 3d. per ton f.o.b.; and for "Wear specials" up to 11s. 9d. There have been few contracts placed this week; but in view of the additional cost through the lower production when the new Act comes into force in January, there is a decided inclination on the part of coalowners to ask advanced prices for forward sales of good gas coals. Coke is firm. Gas coke is in good demand; being quoted from 13s. to 13s. 6d. per ton f.o.b.

Scotch Coal Trade.

Trade is active, on account of an improved demand, which is at least partly attributable to the miners' holiday season being on, in consequence of the approach of which there was a disposition to stock fuel. The prices now quoted are: Ell, 10s. 6d. to 11s. 6d. per ton f.o.b. Glasgow, splint 10s. 9d. to 11s., and steam 9s. 3d. to 9s. 6d. The shipments for the week amounted to 311,161 tons—an increase of 26,375 tons upon the previous week, and of 12,787 tons upon the corresponding week of last year. For the year to date, the total shipments have been 14,917,154 tons—an increase of 675,111 tons upon the corresponding period.

POCKET-BOOKS, CALENDARS, &c.

Acknowledgement has to be made, as is usual at this period of the year, of various useful articles for the office and the pocket. There is a handsome pocket-book from the Gas-Meter Company, of Kingsland Road, N.E., containing a diary and removable self-opening pages for memoranda, and including a coupon for £1000 accident insurance. In the centre there are pockets for cards, stamps, &c.; and some pages of helpful information include tables giving prices and particulars of Croll's patent dry gas-meters and showing the price of gas per 1000 cubic feet at varying quantities per penny and shilling for prepayment meters. Messrs. Parkinson and W. & B. Cowan, of Cottage Lane, E.C., send a blotting pad with an engagement diary at the side; and Messrs. Thomas Cash and Co., of Birmingham, a rough notepaper pad for placing on the desk. A quarterly diary is to hand from Messrs. J. E. Williams and Co., Manchester; and wall calendars from the same firm and from Messrs. Joseph Taylor and Co., of Bolton, and Messrs. Bale and Church, of No. 5, Crooked Lane, E.C.

Illuminating Power of London Gas.—At the close of the notice issued by the Gaslight and Coke Company in regard to the reduction in price that will come into operation with the New Year, to which reference was made in the "JOURNAL" last week (p. 836), it is mentioned that the standard illuminating power of the gas supplied will in future be 14 candles. The standard is now the same all over London.

The British High-Power Gas-Engine Company, Limited, has been registered with a capital of £4000, in £1 shares, to purchase or otherwise acquire any interests in any patents, &c., conferring a right to use any invention in relation to the manufacture, treatment, or dealing with high-power gas-engines, and in particular to acquire from D. Neustadter designs for the manufacture of large gas-engines, &c.

New South Wales Coal Strike and the Sydney Gas Supply.—It was mentioned in the paragraph on this subject in the "JOURNAL" last week (p. 830) that a threatened failure of the gas supply in North Sydney was averted by the Railway Companies furnishing a supply of coal to the North Shore Gas Company. Unfortunately it turned out to be unsuitable for making gas; and the result was that the district was in darkness on Monday night last week, to the great inconvenience of everybody. According to a telegram dispatched on Tuesday, a supply of coal from the Western district was expected in two days; and a telegram dated Thursday brought the news that the supply of gas had been resumed.

Inadequate Electric Street Lighting at Hastings.—An inquiry was held at Hastings, on Monday last week, into the circumstances attending the death of Mr. John Thomas Bray, which occurred as the result of being thrown from a cab when driving down the Linton Road. A verdict of "Accidental death" was returned; but the occurrence gave rise to some correspondence in the local paper. It appears that there were some mounds of stone in the road; and though these were not actually the cause of the trouble, a writer points out that the danger arising from their presence has recently been made worse by the taking away of the old incandescent gas-lamps, which "gave a respectable light," and substituting an electric lamp that gives "just about half the amount of illumination formerly given by the gas." He adds that this is a state of things that the Corporation ought not to allow to remain any longer.

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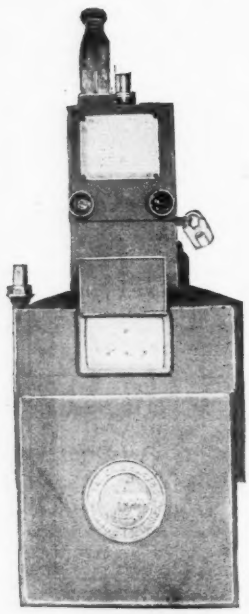

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Alleged Falsification of Time-Sheets.

At the East Ham Police Court last Thursday, Alfred Carter, 38, a clerk, of 22, Gillett Avenue, East Ham, was charged, on a warrant, with wilfully making false entries in the books of the Gaslight and Coke Company, with intent to defraud. Mr. R. Humphreys, who prosecuted, said the allegation against the prisoner was that he put wrong times on the time-sheets, and men were paid too much money. Afterwards he went to the men and obtained the cash from them. Detective-sergeant Ball gave evidence of the arrest, saying that when he told Carter he would have to go to the police-station he said, "All right;" and when charged he made no reply. On this evidence a remand was ordered, and Mr. Humphreys said he did not oppose bail, as the prisoner had worked a number of years for the Company, and he had known of these proceedings for the past five weeks. Bail was allowed.

Quality of Coventry Gas.—It was decided by the Coventry Town Council, at their last meeting, to agree to the proposal of the Gas Committee to obtain expert opinion as to the prevalence of so much sulphur in the gas. Attention was also called to the need of some improvement in the illuminating power; and the Committee and Gas Engineer are to look into the matter.

The Quality of Truro Water Supply.—A report on the subject of the water supply was submitted by the Sanitary Committee to the Truro City Council at their last meeting. Samples of the water had been forwarded to the Chemical Research Association, whose report on the analysis was accompanied with the remark that the results were only moderately satisfactory, and an expression of the opinion that more efficient filtration is necessary. The Mayor (Mr. T. H. Beard) suggested that the report should be forwarded to the Water Company, with a request that they should make provision to supply the city with pure water. Mr. Crewes thought there ought to be no suggestion that the Company were supplying impure water. They were doing their best to give a satisfactory article. The Mayor replied that the Council had to consider the health of the city. It was decided to communicate with the Company.

Thefts from Morecambe Gas-Works.—At the Lancaster County Police Court, a few days ago, Fred Coleman, a painter and gas-fitter, was charged on remand with stealing a large quantity of brass fittings, gas-mantles, lead, copper, &c., value £18 13s. 4d., the property of the Morecambe Corporation, between Oct. 20 and Dec. 10. Mr. E. G. Clark, on behalf of the prisoner, said he had hitherto borne an excellent character. He had returned all the articles, and was under the impression that he would be given another chance. He asked the Bench to deal with the prisoner under the First Offenders Act. This, however, they declined to do. The Chairman said men working for corporations had temptations; and for the sake of others they could not give the prisoner the benefit of the Act. There might have been an excuse if he had been one of the poor unemployed; but for a man receiving regular wages, there was nothing to excuse. He would have to go to prison for six weeks, with hard labour.

Increased Storage at Buckhaven.—On Thursday of last week there was inaugurated a new gasholder and other plant introduced by the Buckhaven Gas Company. Bailie Gillespie presided, and in the course of the evening was presented by the Contractors with a souvenir rose bowl; Mr. Barker making the presentation. Bailie Gillespie, in reply, referred to the developments in the Company since he joined the Board; the consumption being now nearly ten times what it was then.

Water Supply of Instow.—It was reported at the last meeting of the Barnstaple Rural District Council that the Instow Parish Council had considered the two schemes for the supply of water to the parish, and were of opinion that the one proposed by the Barnstaple Water Company was the most feasible and satisfactory. The Chairman (Mr. G. C. Davie) said one advantage of the scheme was that it took in the parish of Fremington, and would provide for a supply of water in future to that district. Mr. Buckingham feared the scheme would be very expensive, and would impose a heavy burden on the people of Instow. It was decided to send the scheme to the Local Government Board.

Shop Fire Through Gas at Herne Bay.—Owing to the globe of a gas-bracket being smashed, the Christmas decorations in the window of Messrs. Skinner and Sons, drapers, William Street, Herne Bay, were ignited last Thursday night; and in an instant the whole of the contents of the window were on fire. The assistants had to run for their lives, and the wife of the proprietor and some of the young ladies were rescued by a ladder from a window at the rear, while three children, who were ill, were removed from the building only just in time. The brigade with their steamer were soon at work, and the position was sufficiently serious for assistance to be summoned from Whitstable. After some hours of hard work on the part of both brigades, the progress of the flames was checked; but the extensive premises were completely destroyed.

Value of the Land for the Carlisle Water Scheme.—Some weeks ago, Sir Benjamin Scott, the Chairman of the Water Committee of the Carlisle Corporation, made the statement that Lord Carlisle claimed £33,000 for land for the Geltsdale scheme valued at £3000 by the Corporation's valuers, and that this was an instance of the need for legislation such as was proposed in the Budget. Lord Carlisle, replying through the Press, said that, in talking of "a small piece of moorland" Sir Benjamin was misstating the Corporation's claim. At the meeting of the Town Council last Tuesday, Sir Benjamin said the land acquired was a little more than 5 acres in Geltsdale, and a little more than 1 acre at the end of Castlecarrock reservoir, together with 7359 yards of underground pipe easement, 15 manhole air-valves, 3 scours, and 15 posts to indicate the line of underground telephone. The Council could judge whether the ground was moorland. He denied that Lord Carlisle offered to settle the claim for £10,000; his agent asked £15,000. The Corporation offered £5000, and Lord Carlisle then asked £15,000, with conditions which the Corporation could not accept. Lord Carlisle was begging the question when he said he did not claim £30,000; his principal witness at the arbitration claimed for £32,797, of which upwards of £22,000 was for water. The Arbitrator awarded £18,738. The Corporation sought to contest the award; but it was confirmed.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 872.

Issue	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
590,000	10	Oct. 4	10	Alliance & Dublin 10 p.c.	17—17½	..	5 14 3
298,955	10	,,	7	Do. 7 p.c.	11⅞—12½	..	5 14 3
310,000	Stk.	July 14	4	Do. 4 p.c. Deb.	100—102	..	3 18 5
200,000	5	Oct. 28	6½	Bombay, Ltd.	5⅞—6	..	5 8 4
40,000	5	,,	6½	Do. New, £4 paid	4⅞—4⅞	..	5 6 8
50,000	10	Aug. 26	5	Bourne-mouth Gas & Water	B 7 p.c.	..	4 3 7
311,810	10	,,	7		Pref. 6 p.c.	15⅛—15⅝	..	3 16 2
75,000	10	,,	6				
380,000	Stk.	Aug. 12	12½	Brentford Consolidated	253—256	..	4 17 8
300,000	,,	,,	9½	Do. New	189—191	..	4 19 6
50,000	,,	,,	5	Do. 5 p.c. Pref.	120—122	..	4 2 0
206,250	,,	June 11	4	Do. 4 p.c. Deb.	100—102	..	3 18 5
220,000	Stk	Sep. 10	1	Brighton & Hove Orig.	217—220	+8	5 0 0
246,320	,,	,,	8	Do. A Ord. Stk.	153—156	+3½	5 2 7
460,000	20	Oct. 14	10	British	42⅜—43½	..	4 11 11
109,000	Stk.	Aug. 26	6	Bromley, A 5 p.c.	118—120	..	5 0 0
165,700	,,	,,	4½	Do. B 3½ p.c.	88—90	..	5 0 0
82,278	,,	,,	5½	Do. C 5 p.c.	106—108	..	5 1 10
55,000	,,	June 25	3½	Do. 3½ p.c. Deb.	88—90	..	3 17 9
500,000	10	Oct. 14	7	Buenos Ayres (New) Ltd.	14—14½	..	4 16 7
250,000	Stk.	June 25	4	Do. 4 p.c. Deb.	99—101	..	3 19 3
100,000	10	—	—	Cape Town & Dis., Ltd.	3—4	..	—
100,000	10	—	—	Do. 4½ p.c. Pref.	5⅛—5⅜	..	—
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	47⅛—48½	..	6 3 9
100,000	Stk.	June 25	4½	Do. 4½ p.c. Deb. Stk.	82—84	..	5 7 2
157,150	Stk.	Aug. 12	5	Chester 5 p.c. Ord.	108½—110½	..	4 10 6
1,493,280	Stk.	Aug. 26	5⅛	Commercial 4 p.c. Stk.	109—111	..	4 13 8
560,000	,,	,,	5	Do. 3½ p.c. do.	103—105	..	4 15 3
475,000	,,	June 11	3	Do. 3 p.c. Deb. Stk.	81—83	..	3 12 3
800 000	Stk.	Dec. 10	5	Continental Union, Ltd.	95—97*	..	5 3 1
200,000	,,	,,	7	Do. 7 p.c. Pref.	137—139*	..	5 0 9
492,270	Stk.	—	5	Derby Con. Stk.	121—123	..	4 1 4
55,000	,,	—	4	Do. Deb. Stk.	103—105	..	3 16 2
148,995	,,	Oct. 2	5	East Hull 5 p.c. Ord.	97—99	..	5 1 0
486,090	10	July 14	12	European, Ltd.	24½—25	..	4 16 0
354,060	10	,,	12	Do. £7 10s. paid.	18—19	..	4 14 9
15,141,545	Stk.	Aug. 12	4⅝	Gas light and Coke	4 p.c. Ord.	103—104	+½	4 9 8
2,600,000	,,	,,	3½		3½ p.c. max.	87—89	..	3 18 8
3,799,735	,,	,,	4		4 p.c. Con. Pref.	103—105	..	3 16 2
4,193,975	,,	June 11	3		3 p.c. Con. Deb.	£2—94	..	3 11 5
258,740	Stk.	Sep. 10	5	Hastings & St. L. 3½ p.c.		92—94	..	5 6 4
82,500	,,	,,	6½	Do. do. 5 p.c.		117—119	..	5 9 3
70,000	10	Sep. 29	11	Hongkong & China, Ltd.		17⅛—18	..	6 2 3
131,000	Stk.	Sep. 10	6½	Ilford A and C		144—146	..	4 9 0
65,780	,,	,,	5	Do. B		108—110	..	4 10 11
65,500	,,	June 25	4	Do. 4 p.c. Deb.		102—104	..	3 16 11
4,940,000	Stk.	Nov. 11	8	Imperial Continental		175—177	..	4 10 5
1,235,000	Stk.	Aug. 12	3½	Do. 3½ p.c. Deb. Red.		94—96	..	3 12 11
195,242	Stk.	Aug. 26	6	Lea Bridge Ord. 5 p.c.		119—121	..	4 19 2
561,000	Stk.	,,	10	Liverpool United A		223—225	..	4 8 11
718,100	,,	,,	7	Do. B		166—168	..	4 3 4
306,083	,,	June 25	4	Do. Deb. Stk.		104—106	..	3 15 6
75,000	5	Nov. 26	6	Malta & Mediterranean.		4½—5	..	6 0 0
560,000	100	Oct. 1	5	Met. of 5 p.c. Deb.		99—102	..	4 18 0
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.		100—102	..	4 8 3
541,920	20	Nov. 11	3½	Monte Video, Ltd.		12½—13	..	5 7 8
1,775,892	Stk.	July 29	4½	Newc'tle & G'tesh'd Con		106—108	..	4 3 4
518,795	Stk.	June 25	3½	Do. 3½ p.c. Deb.		93—94	..	3 14 6
55,940	10	Aug. 26	7	North Middlesex 7 p.c.		13—13½	..	5 3 8
300,000	Stk.	Nov. 26	8	Oriental, Ltd.		137—139	..	5 15 1
60,000	5	Sep. 10	8	Ottoman, Ltd.		6⅛—6⅜	..	6 5 6
31,800	53	Aug. 26	13	Portsea Island A.		137—139	..	4 19 0
60,000	50	,,	13	Do. B.		129—131	..	4 19 3
100,000	50	,,	12	Do. C.		120—123	..	4 17 7
114,800	50	,,	10	Do. D and E.		101—103	..	4 17 1
398,490	5	Oct. 28	7	Primitiva Ord.		7—7½	..	4 16 7
796,980	5	July 29	5	Do. 5 p.c. Pref.		5⅛—5⅜	..	4 13 0
488,903	100	Dec. 1	4	Do. 4 p.c. Deb.		97—99	..	4 0 10
1,000,000	10	Oct 14	8	River Plate Ord.		17—17½	+⅛	4 11 5
312,650	Stk.	June 25	4	Do. 4 p.c. Deb.		1 0—102		3 18 5
250,000	10	Sep. 29	8	San Paulo, Ltd.		14½—15	..	5 6 8
62,500	10	,,	6	Do. 6 p.c. Pref.		11⅝—12¼	..	4 18 0
125,000	50	July 1	5	Do. 5 p.c. Deb.		51—52	..	4 16 2
135,000	Stk.	Sep. 10	10	Sheffield A		233—235	..	4 5 1
209,984	,,	,,	10	Do. B		233—235	..	4 5 1
523,500	,,	,,	10	Do. C		233—235	..	4 5 1
70,000	10	Oct. 14	10	South African		12½—12¾	..	7 16 11
6,429,895	Stk.	Aug. 12	5⅛	South Met., 4 p.c. Ord.		119—121	..	4 8 1
1,895,445	,,	July 14	3	Do. 3 p.c. Deb.		82—84	..	3 11 5
209,820	Stk.	Aug. 26	8	South Shields Con. Stk.		160—162	..	4 18 9
605,000	Stk.	Aug. 12	5½	S'th Suburb'n Ord. 5 p.c.		119—121	..	4 10 11
60,000	,,	,,	5	Do. 5 p.c. Pref.		120—122	..	4 2 0
117,058	,,	July 14	5	Do. 5 p.c. Deb. Stk.		122—124	..	4 0 8
502,310	Stk.	Nov. 11	5	Southampton Ord.		109—111	..	4 10 1
120,000	Stk.	Aug. 12	6⅞	Tottenham and Edmonton	A 5 p.c.	133—135	..	5 1 9
453,940	,,	,,	5⅝		B 3½ p.c.	111—113	..	4 15 3
149,470	,,	June 25	4		4 p.c. Deb.	100—102	..	3 18 5
182,380	10	June 11	8	Tuscan, Ltd.		9—9½	..	8 8 6
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.		101—102	..	4 18 0
236,476	Stk.	Aug. 14	5	Tynemouth, 5 p.c. max.		110—112	..	4 9 3
255,636	Stk.	Aug. 26	6⅜	Wands-worth	B 3½ p.c.	139—141	..	4 14 0
79,416	,,	June 25	3		3 p.c. Deb. Stk.	73—75	..	4 0 0
895,872	,,	Aug. 12	5⅜	West Ham 5 p.c. Ord.		—	..	—
210,000	,,	,,	5	Do. 5 p.c. Pref.		—	..	—
253,300	,,	June 25	4	Do. 4 p.c. Deb Stk.		—	..	—

Prices marked * are "Ex div."

Complaint was made at the last meeting of the Redruth Urban District Council of the unsatisfactory lighting of the main streets; and the Clerk was instructed to arrange for an interview between representatives of the Council and of the Urban Electric Supply Company. The Chairman of the Council (Mr. Trestall) said the system of lighting was entirely wrong, and ought to be altered.

The members of the Gas Committee of the Brighouse Town Council, having considered the wages of several of the grades of workmen employed at the gas-works, recommended that the retort-house men be paid time-and-a-half for Sunday labour, and that in response to the application of the yardmen their request for an advance be met by increasing their wages from 23s. to 24s. per week.

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Tar.

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Clerk to the Council.
Town Hall Buildings,
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NOTICE is Hereby Given, that the TRANSFER BOOKS of this Company, so far as they relate TO CAPITAL STOCKS, WILL BE CLOSED at Four o'clock p.m., on Tuesday, the 4th day of January next, and WILL BE RE-OPENED immediately after the HALF-YEARLY ORDINARY GENERAL MEETING of the Company to be held on Friday, the 4th day of February next.
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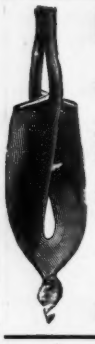

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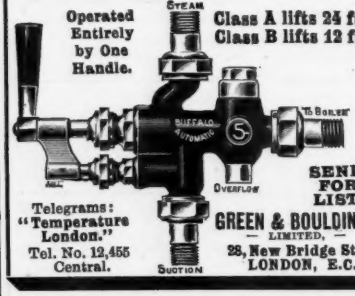

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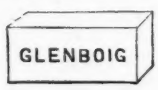

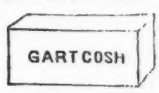

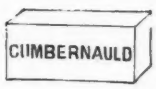

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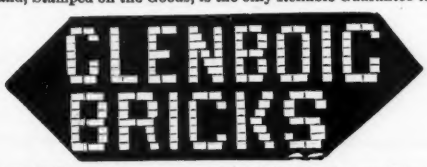

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Undernoted we give a Table of Analysis and Physical Characteristics of a sample of Glenboig Fire-Clay by J. T. Norman, London; and, in submitting a report from a responsible and reliable public analyst, we would here draw attention to the unreliable character of some recently published analyses where a manufacturer selects not only his own samples, but also those of his competitor, and has them treated by a private analyst. SUCH STATEMENTS ARE ALTOGETHER UNTRUSTWORTHY.

ANALYSIS OF GLENBOIG FIRE-CLAY.

By JOHN T. NORMAN, Esq., F.C.S., &c., The City Central Laboratory, LONDON.

THE GLENBOIG UNION FIRE-CLAY CO., LTD., GLENBOIG, SCOTLAND.

23, Leadenhall Street,
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Dear Sirs,

I have completed the investigation of the samples of Clay received from you on the 10th inst., and now beg to report the results.

CHEMICAL ANALYSIS.

	Raw.	Fired.
Silica, free	3·03	3·49
Silica, combined	43·20	49·77
Alumina	36·55	42·10
Ferric oxide	1·80	2·08
Titanic oxide	1·30	1·50
Lime	trace	trace
Magnesia	trace	trace
Alkaline oxides	trace	trace
Sulphates as trioxides	0·92	1·06
Loss on Ignition	13·20	—
	100·00	100·00

PHYSICAL RESULTS.

Density	2·65
Volume weight	1·90
Porosity	15·4 %
Linear shrinkage at 100° C.	3·70%
" " " 1050° C.	4·76%
" " Total	8·46%
Volume shrinkage at 100° C.	10·7 %
" " " 1050° C.	12·6 %
" " Total	23·3 %
Plasticity	20·0 %
Fire Stability	1850° C. equiv. to 3362° F.

(SEGER CONE 36.) (New Scale CONE 38.)

(Signed) J. T. NORMAN.

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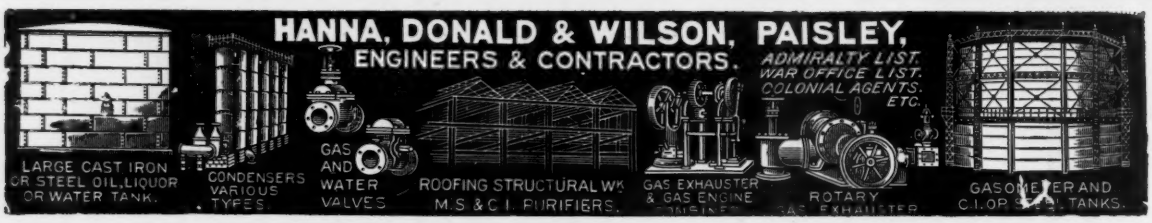
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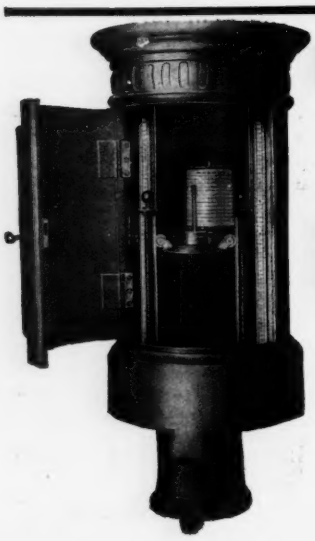

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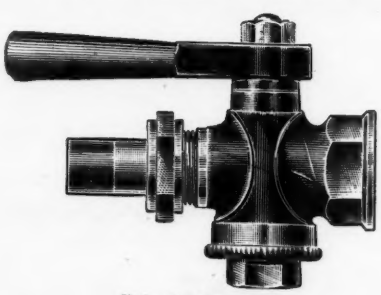

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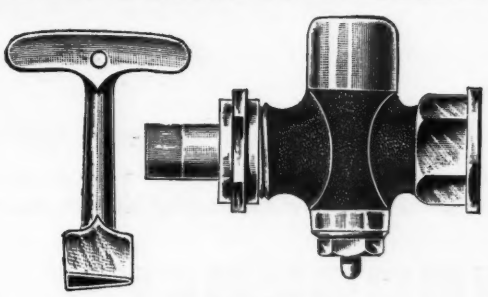

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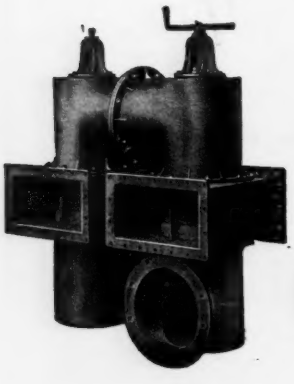

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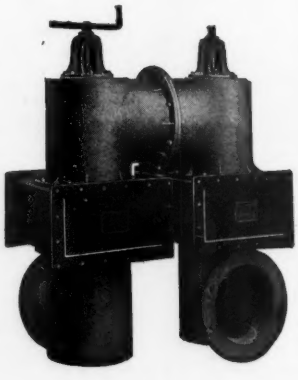

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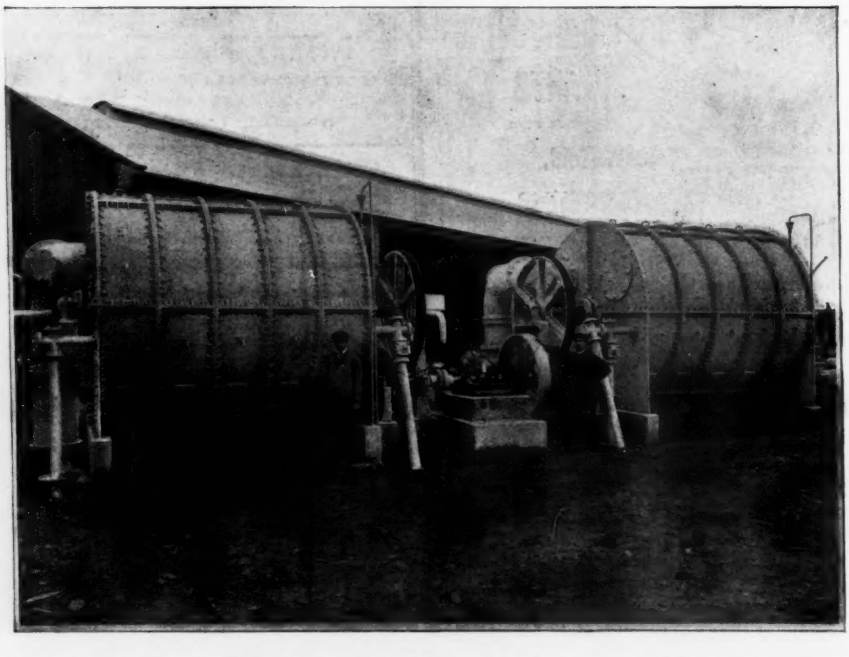

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Welsbach
LIGHT
Inverted Arc Lamp, Fig. 623.

Storm Proof—
For Exterior Lighting.

Welsbach-Kern
(Patent) Inverted System

BRITISH MADE.

BRITISH MADE.

Height over all.

1-light . . .	1 ft. 8 ins.
2-light . . .	2 ft. 4 ins.
3-light . . .	2 ft. 4 ins.
4-light . . .	2 ft. 7 ins.

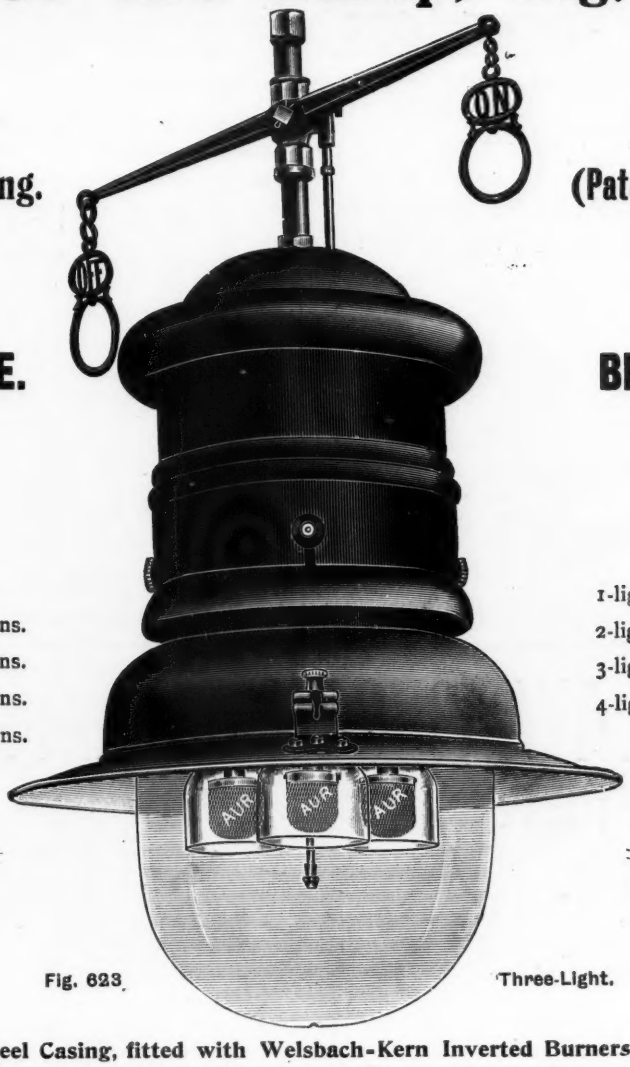

Fig. 623. Three-Light.

Width over all.

1-light . . .	1 ft. 1 in.
2-light . . .	1 ft. 5 ins.
3-light . . .	1 ft. 5 ins.
4-light . . .	1 ft. 8 ins.

ENAMELLED Green Steel Casing, fitted with Welsbach-Kern Inverted Burners, Gas and Air Regulators operated from outside. Sliding Door to give access to Burners for cleaning purposes. Fitted with Magnesia Nozzles, Welsbach Mantles, and Glass Mantle Protectors. Complete as shown. Highly efficient and regenerative.

	Gas per hour.	*C.P.*	*Steel.*	*Copper Case.*		*Gas per hour.*	*C.P.*	*Steel.*	*Copper Case.*
1-light	4 feet	125	**30/-**	**5/-** extra.	3-light	12 feet	400	**52/6**	**6/-** extra.
2-light	8 feet	260	**47/6**	**6/-** extra.	4-light	16 feet	550	**72/6**	**9/-** extra.

All on or off, or One light on and the rest off, **7/6** per Lamp extra. Cup and Ball, **3/6** per Lamp extra.

RENEWALS.

Glass Mantle Protectors (Fig. 623) **3/4½** per dozen, or in case lots of 5 gross, **33/-** per gross.

	1-Light.	*2-Light.*	*3-Light.*	*4-Light.*
Clear Glass Globes, each	**2/3**	**5/9**	**5/9**	**9/-**
" " " In Case lots per dozen.	**19/6**	**57/9**	**57/9**	**93/-**
Case contains . .	*80*	*18*	*18*	*12*

	1-Light.	*2-Light.*	*3-Light.*	*4-Light.*
Wired Globes, extra each	**2/-**	**2/-**	**2/9**	**3/6**
Parabolic Reflector, extra "	**3/6**	**6/-**	**7/6**	Not made

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MAIN LAYING.

Paper by PERCY GRIFFITH, M.Inst.C.E., and BRUCE McGREGOR GRAY, Assoc.M.Inst.C.E., before the Association of Water Engineers.

A. The Authors used *Flanged Pipes* for the Rising Main up the Steep side of the Barff, and their experience proved that this was not an advantage, as *the rigidity of the Joints involved considerable difficulty* in regard to the depth of the Trench, and a good deal of Cutting to make the final Connections at each end of the Pipe-Line.

B. In the case of the Delivery Main, the Joints were *Ordinary Socket Joints*, but made with Lead only. The only difficulty met with here was the necessity for *pouring the Lead in* at a suitable temperature *to prevent it melting the Solid Lead Fillet*, and *running through into the Pipe.*

C. In some of the Smaller Branch Connections, Lead Wool was used, and proved highly successful.

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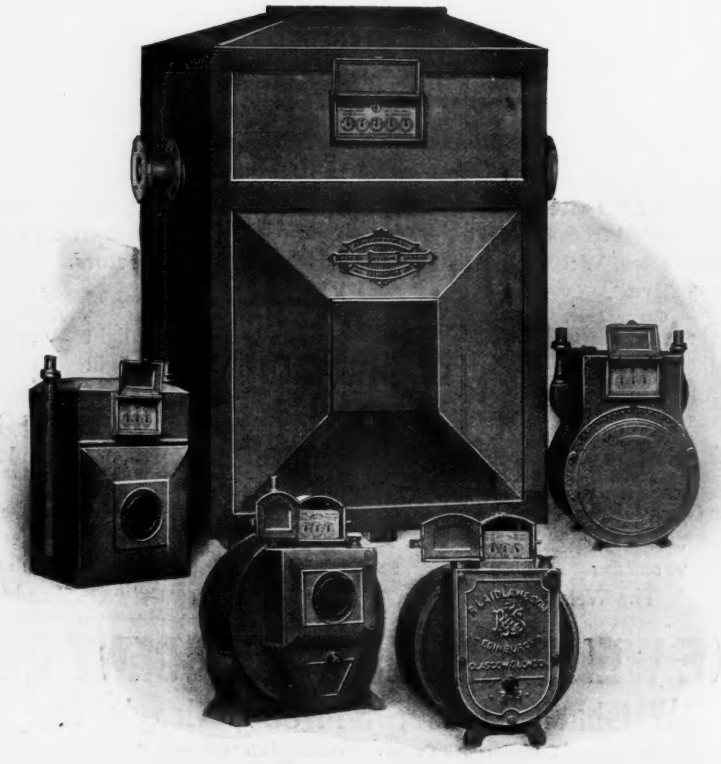

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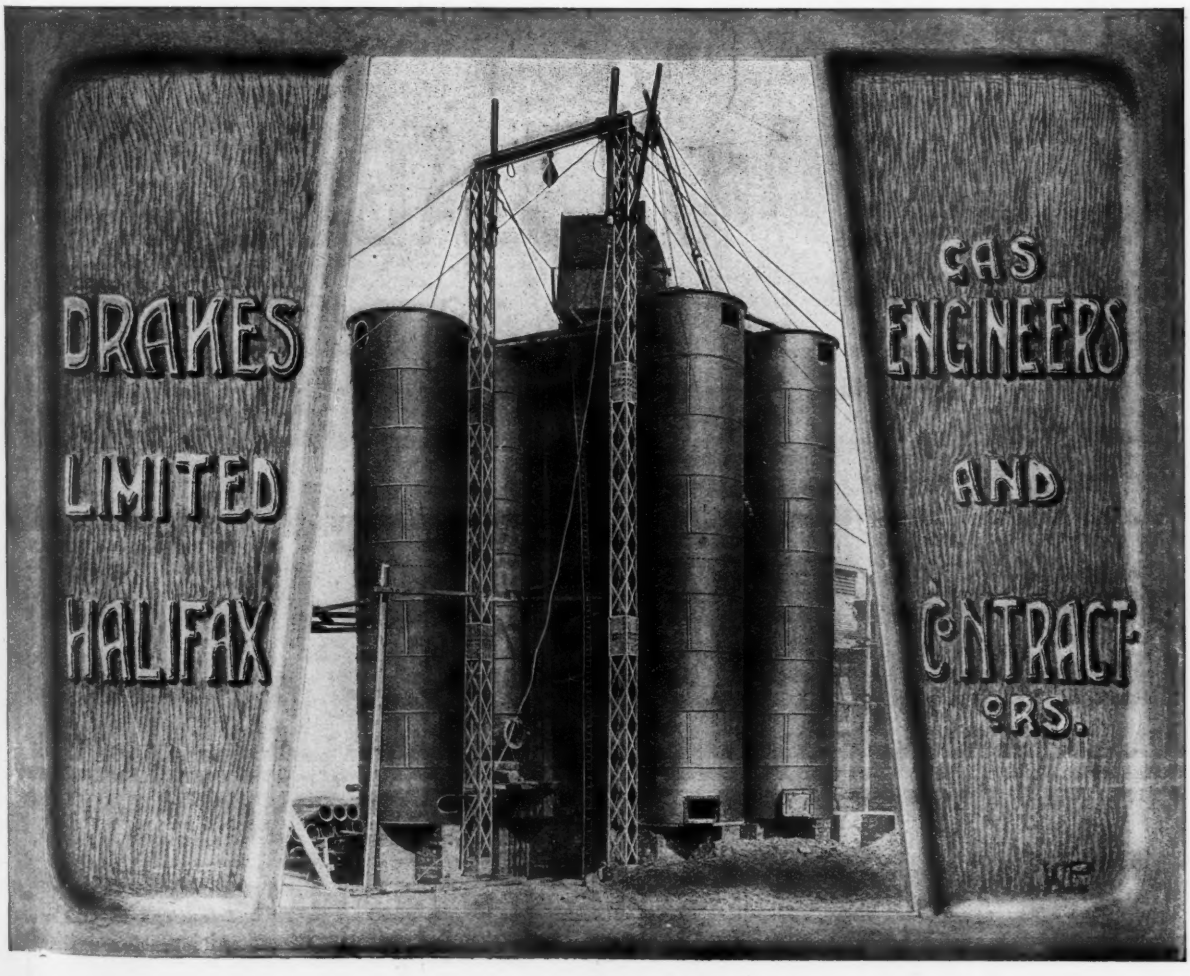

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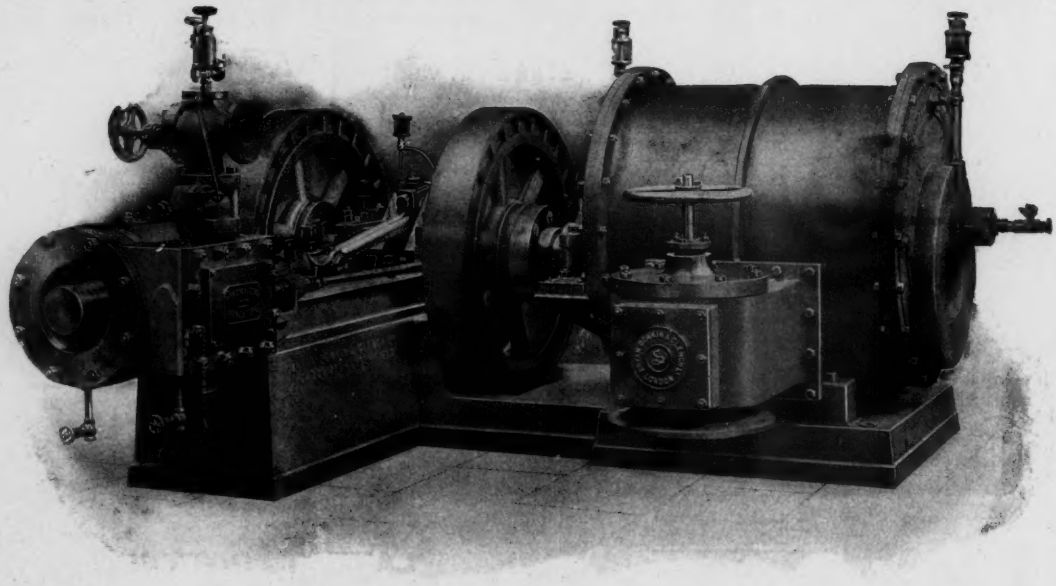

Fig. 531.

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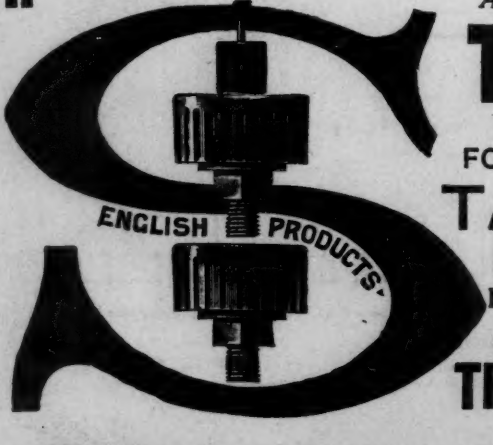

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